

PACIFIC SEABIRDS



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PACIFIC SEABIRD GROUP

Dedicated to the Study and Conservation of Pacific Seabirds and Their Environment

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Pacific Seabirds

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ARTICLES

A NEW METHOD FOR AGEING MARBLED MURRELETS AND THE EFFECT ON PRODUCTIVITY ESTIMATES

Linda L. Long, C. John Ralph, and Sherri L. Miller

Abstract: Accurate knowledge of the number of newly-fledged juveniles offshore is critical to estimates of productivity of the threatened Marbled Murrelet (*Brachyramphus marmoratus*). We describe a method for collecting productivity data which allows researchers to objectively evaluate age determinations and their effect on juvenile percentages. This has the potential to reduce the effect of observer variability and the number of misidentified birds, especially late in the breeding season when adults in late pre-basic molt are very similar to juveniles. We analyzed the timing of this molt in adults, and found some variation between regions and years. Therefore, critical dates for identification of adults in late molt versus juveniles may need to be reassessed annually. During our study, productivity estimates ranged from 1% to 7% juveniles. We used two methods for assessing the effect of missed juveniles. Even after adjusting for misclassified murrelets, the resulting juvenile percentages (1% to 17%) would suggest an unstable population in our study area.

Key words: Marbled Murrelet, *Brachyramphus marmoratus*, productivity, juvenile, molt, ageing

INTRODUCTION

A measure of productivity is one of the vital components of a demographic model. Productivity of Marbled Murrelets (*Brachyramphus marmoratus*) has been estimated from the proportion of the newly-fledged young on the sea (Beissinger 1995, Ralph and Long 1995, Strong et al. 1995, Kuletz and Kendall 1998). It has been the only feasible way to estimate productivity, as nests are notoriously difficult to find and monitor. The newly-fledged young have a plumage that is dark above and light below, quite distinct from the mostly dark alternate plumage of the potentially breeding adult. We will address methods to improve the quality of age determinations and thus the estimates of productivity.

A few critical factors influence correct identification of juveniles at sea, including observer variability, the stage of progression of pre-basic molt in adults, and the timing of fledging of juveniles. Young fledge rather asynchronously for a seabird, over a 24-week period in some areas (Hamer and Nelson 1995), therefore dark-and-light (basic-plumaged) birds can include both newly-fledged juveniles and adults in late pre-basic molt. Also, a small percentage (about 2% in Prince William Sound, Alaska) of adults may not molt into

alternate plumage in the spring, but remain in basic plumage all year (Kuletz and Kendall 1998). Despite these uncertainties, counts of juveniles at sea form an important part of the basis for listing of the species as "threatened" (USFWS 1992), as they document the species' apparent low reproductive rates (Beissinger 1995).

Since 1993, we have been using and testing methods to evaluate murrelet plumage data. In this study, we evaluated observations taken by our observers. We describe and evaluate several factors that may influence the timing of adult molt and discuss their effect on correct identification of young and resulting productivity estimates.

METHODS

We collected plumage data on Marbled Murrelets during offshore surveys in northern California, from the Oregon border south to False Cape Mendocino in Humboldt County starting in 1994. Each year, we began collection of plumage data when the first dark-and-light murrelet was seen on the water, usually in mid-July. For analyses, we divided the field season into 10-day periods.

Crews were trained in murrelet ageing criteria and adult molt patterns at the beginning of the survey season, using

museum study skins and photographs of murrelet plumages. At sea, experienced observers trained the crews after the first juveniles and molting adults appeared on the water. Observers and drivers discussed the observations in order to increase consistency between observers.

Data collection and ageing criteria

We collected data on Marbled Murrelet plumages during line transect census surveys conducted at variable distances from shore. We collected data on the first 5-10 birds encountered on each 2-km sampling unit. One observer recorded all data. When the bird was sighted, observers used binoculars to obtain the best view of the bird. The driver maneuvered the boat toward the bird to the closest distance possible without flushing the bird. We observed birds from a mean distance of 28 m (from 1 to 80 m), and a mean time of 15 seconds (minimum 1 second [breeding birds], maximum 5 minutes [dark-and-light birds]). After sufficient data were collected, the census survey resumed.

For each bird, observers recorded data on four feather areas: the neck, sides, breast, and belly. Some areas were seen best during certain behaviors. The breast and belly were most visible when the birds flapped their wings, and the

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posterior portion of the belly was visible as birds dove. For each feather area, the observer recorded the percentage of the plumage that was dark, consisting of either blotches or fine markings. For example, a bird in full alternate (breeding) plumage with dark blotches covering most of the neck, would be scored 90% for that area. The observer estimated the percentage of dark by regarding the bird as if covered by a grid of 1-cm squares, each cell being approximately the size of one feather, and estimating the percentage of all the cells that were predominantly dark. The observer also recorded the presence or

absence of fine markings on the feathers, described as "speckling" by Carter and Stein (1995).

For wing molt, we recorded: (1) the presence or absence of a gap in the flight feathers, which occurs early in the molt sequence when the inner primaries (and/or secondaries) are molting; and (2) wing shape, as either pointed (a normal wing) or blunt (when all of the outer primaries have molted later in the sequence) (Carter and Stein 1985).

Other data were taken which might aid in identification of young birds. The observer recorded an individual's size as the percentage relative to others in the

group, with the largest in the group being 100%. When young fledge, Carter and Stein (1995) thought them to be about 70% of the size of an adult, thus potentially separable when accompanied by an adult. Other potential juvenile characteristics, such as egg tooth, bill coloration, or unusual behaviors, were also noted.

Observers then recorded their appraisal of the type of plumage and stage of molt using the following *plumage categories*: B = breeding plumage, no molt; E = early molt, molt covers less than 50% of the body; M = mid-molt, molt covers more than 50%

TABLE 1. Criteria for determining age of birds and quality of observation. Ageing criteria are listed in order of importance for assigning certainty levels for an age classification. For instance, a dark-and-light bird with blunt wings might be a "certain late-molt adult," but one identified as a juvenile based mainly on its small size might be an "uncertain juvenile." Few criteria are absolute (these are marked *), but each contributes to the overall quality of the observation.

1A. Criteria for differentiating adults and juveniles

	Adult	Juvenile
<i>Ageing criteria</i>		
<i>Wing:</i>		
Gap in primaries or secondaries	present*	absent
Tip shape	blunt, paddle-shaped*	pointed
<i>Breast, neck, side, or belly plumage:</i>		
Characteristic of dark coloring	blotchy*	fine markings*
Percent dark	0-95%	0-15%* ¹
Size (compared to accompanying bird)	100%	<90%
<i>Criteria, by date, required to age dark-and-light birds</i>		
Before 15 August	plumage molt	none, but certainty = "probable" without other criteria
15 August-1 September	plumage molt	no wing molt, fine markings
After 1 September	plumage molt	fine markings

¹Used as an absolute criterion for age if 0% dark and before 15 August, with full wings before 1 September, or if dark coloration is fine markings

1B. Criteria for quality of observation

	Good	Poor
Length of observation (secs)	≥ 15	< 15
Nearest distance to bird (m)	≤ 40	> 40
Backlighting	no	yes
View of bird	front, side	back

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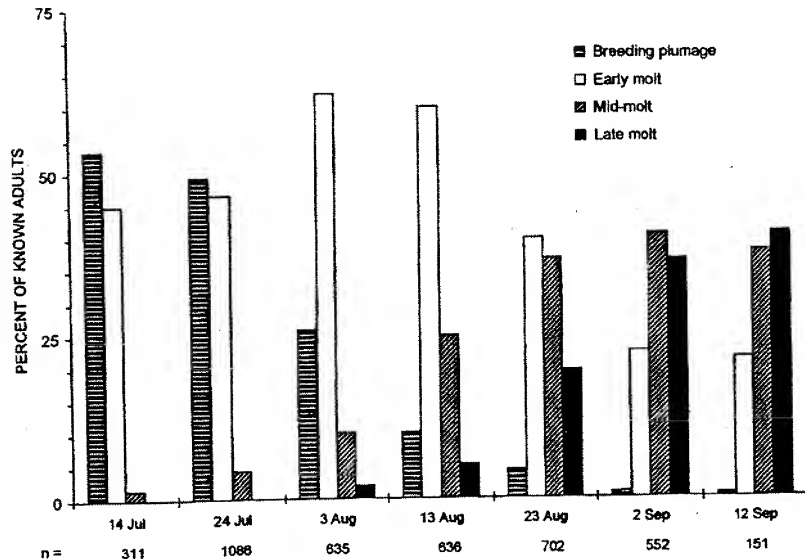


FIGURE 1. Percentage of known adults in four plumage categories by 10-day periods during 1995-1998. Date is the beginning of each 10-day period. n = sample size.

of the body, but easily distinguishable as a molting bird at a distance; L = late molt, bird appears as a bird in basic plumage at a distance, but still distinguishable as an adult by molt in the wings or belly; W = basic (winter) plumage, unidentifiable to age; or J = juvenile bird, in juvenal plumage (fine markings), or a basic-plumaged bird determined to be a juvenile because of an early observation date (before August 15). Since up to 2% of adults may not molt out of basic plumage in some areas (Kuletz and Kendall 1998), juveniles aged by date alone were usually given a probable certainty level (see below). We have used plumage categories to age murrelets since we started collecting this type of data in 1993, and continued to refine them over the next two years.

Quality of observations

We recorded the viewing conditions to assess the quality of the observation (Table 1). The observer recorded the closest distance to the bird while obtaining the majority of the data and an estimate of the total time that the bird's plumage characteristics were visible. Observers also recorded if the bird was backlit during the entire observation.

determination, the observer recorded the certainty of the observation as definite, probable, or uncertain.

Evaluation of observations

Observations were later independently evaluated, using criteria similar to those used by the observers. The evaluator first considered ageing criteria, and then the quality of the observation (Table 1). We evaluated those birds that were most difficult to separate: juveniles, mid- and late-molt adults, and winter-plumaged, unknown birds.

We used two critical dates for ageing. Dark-and-light birds observed before 15 August, without other plumage information, such as blunt wings or dark blotches, were considered juveniles. This date was chosen because less than 3% of adults seen prior to 15 August were in late-molt plumage (Figure 1). After this date, we felt that juveniles needed at least one other plumage criterion to be aged, such as full wings (no gaps in primaries, pointed shape) or fine markings (Table 1). After 1 September, dark-and-light

Based on the above data, as well as the overall amount and quality of information leading to the age

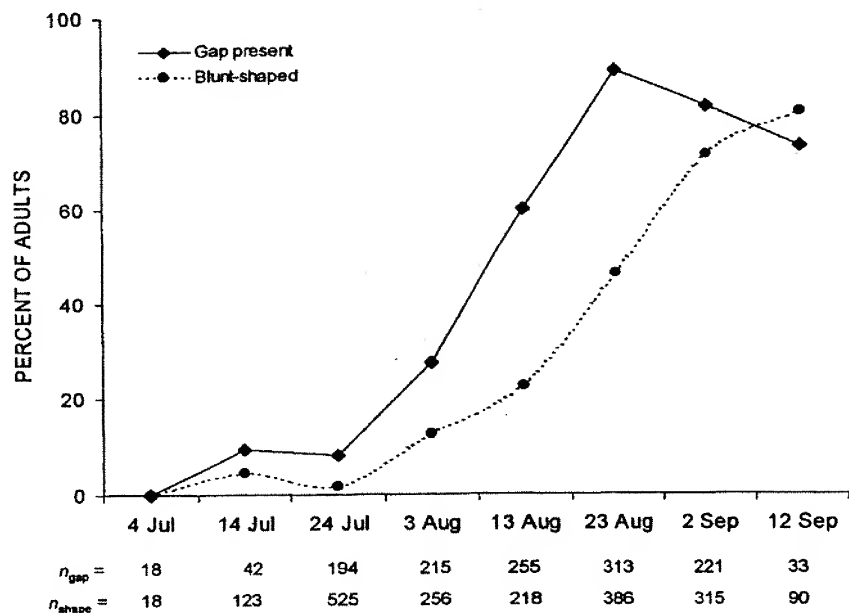


FIGURE 2. Percentage of adults examined at sea during 1994-1999 showing wing gaps (inner primaries or secondaries molting) or blunt-shaped wing tips (outer primaries molting). n_{gap} or n_{shape} = number of birds for which the presence or absence of gaps or the type of wing shape, respectively, were recorded. Date is the beginning of each 10-day period.

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birds were considered unknown-aged and in basic (winter) plumage, unless the observer recorded fine markings (a definite juvenile) or the last stage of adult molt (usually on the belly or in the wings). After this date, full wings on a dark-and-light bird were not considered indicative of juveniles, because adults could have completed wing molt. Wing molt can last as little as 45 days (Carter and Stein 1995), so the most conservative estimate for completion of wing molt would be about 1 September, 45 days after 14 July when wing gaps were first observed (Figure 2).

In the evaluation of certainty levels, we considered approximately 15 seconds as an adequate time to age most birds (Table 1). Distances under 40 m gave the best viewing for plumage details. Backlighting was considered a negative factor since, with poor lighting, a late-molt adult could be mistaken for a breeding bird. Plumage details that were “absolute” (Table 1) increased the certainty level (such as fine markings for juveniles or wing molt for adults). Together, the quality of the observation and plumage category were used to assign a new certainty level. For instance, a 5-second observation, at >40 m from the observer, and backlit would be considered to have poor viewing conditions. However, if a gap in the wings was recorded, the evaluation would be a definite molting adult.

Statistical analyses

Timing of adult molt—The differences in timing of adult molt between years and regions might affect classification of juveniles and, therefore, our estimates of productivity. We compared the percentage of birds in late molt for all possible paired combinations of years (1995 vs. 1996, etc.) within 10-day periods, using the z-test for two independent percentages ($P < 0.05$, Hicks 1993:32) to test for differences between years. We also compared the percentage of birds in each stage of molt between north and south regions within 10-day periods.

We understand the inherent problems with possible interactions

TABLE 2. Comparison of two methods for estimating misidentified juveniles late in the season for four years. The first method calculates the percentage boundaries by including the unknown birds into either the total number of adults (lower limit) or juveniles (upper limit). The second method is based on Beissinger's (1995) linear regression model of the cumulative percentage of fledged birds. For this, we adjusted the percentage from the 3-12 August period: adjusted percent of juveniles = $\text{percentage}_{\text{old}} / 0.78$.

Year	Unadjusted percent juveniles	Calculated percentage boundaries	Linear regression
1994	6.8	6.4 – 13.1	10.1
1995	4.5	3.3 – 7.7	3.1 ¹
1996	1.4	1.4 – 3.6	1.9
1997	3.8	3.3 – 16.9	4.4

¹13-22 August period used, due to small sample size in 3-12 August period ($n = 16$). Adjusted percent of juveniles = $\text{percentage}_{\text{old}} / 0.91$.

between two variables (year or region with 10-day periods). However, percentage data have a binomial distribution and cannot be analyzed with regular ANOVA tests. After consultation, it was suggested we use this approach.

Calculated upper and lower percentage boundaries—To assess the possible impact of adding unknown birds to the productivity index, we estimated the potential upper and lower boundaries of the percentage of juveniles in the population (Table 2). We calculated the upper boundary by including all the unknown birds as juveniles. For the lower boundary, we included all the unknown birds as adults. We did this for 1994-1997, the years that we evaluated observations.

Adjusted percentages from regression model—Another method we used to assess the potential effect of misidentified juveniles was to base the percentage of juveniles on a period of the breeding season when few juveniles are misidentified. We used the 3-12 August period, the period just before the adult molt makes it difficult to age juveniles. From data on fledging dates (Nelson and Hamer 1995), Beissinger (1995) used linear regression ($y = 0.012x - 1.919$; y = proportion of nests fledged, x = Julian date) to estimate the cumulative

proportion of nests fledged for each date of the season. We calculated 78% of young had fledged by the end of the selected period. We then adjusted the percentages for each year by dividing by 0.78.

RESULTS

Progression of molt in adults

We began offshore censuses by June from 1995-1998. We saw one unknown dark-and-light bird during censuses in late June 1997. In the other years, the first dark-and-light birds were observed in mid-July (Table 3).

The timing of adult molt influences our ability to distinguish molting adults from juveniles, as the adults in late molt closely resemble juveniles. As expected, the proportion of molting adults in each successive molt stage generally formed a sequence through the season (Figure 1). The proportion of adults in breeding plumage declined rapidly after the end of July, and approached zero by late August. The proportion of birds in early molt were highest in August. In mid-July, some birds were already in mid-molt, the heaviest molt with most feather areas involved. This stage of molt peaked from the end of August into early September.

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3. Dates of first dark-and-light birds observed on offshore surveys in northern California, 1995-1998, and observers' classifications. All surveys began by 1 June these years.

Date	Observers' age classification
22 July	juvenile (no plumage data)
14 July	unknown (no plumage data)
26 June	unknown (no plumage data)
14 July	juvenile (fine markings)

Its in the late stage of molt were first in early August. By mid-September, 50% of the adults were in late molt. Wing molt of the adults began in the primaries and secondaries in mid-July, when 10% of the adults were mottled with wing gaps (Figure 2). This ended in late August with almost 100% adults with wing gaps. The outer primaries molted later, beginning around 1 August when about 10% of birds had blunt wings. The proportion of adults in late molt in the outer primaries continued to increase through September.

As adults completed their molt, they became indistinguishable from many young. In this stage of plumage, both were classified as "unknown-aged." The proportion of unknown, basic-plumaged birds was low until mid-September, when they rapidly increased (Figure 3).

Annual differences in adult molt

Observations of adults in late molt (with mostly dark-and-light plumage) varied among years (Figure 4). In 1995, we observed a significantly ($P \leq 0.05$) higher percentage of adults in late molt

earlier in the year than in 1996 and 1997, based on the 13-22 August sample. Adults molted later in 1996 compared to 1997, based on the lower percentage in early September.

Regional differences in molt

Adults appeared to molt earlier in the north (Crescent City to Klamath River) as compared to the south (Redwood Creek to False Cape Mendocino) (Figure 5). Specifically, in the north a significantly ($P \leq 0.05$) higher percentage of adults were in the final, late-molt stage, in three of the four time periods when late-molt adults were present. Conversely, the percentage of adults in early and mid-molt tended to be higher in the south over the five periods.

Evaluation of age classifications

Between 2 and 5% of the observations for all age classifications were reclassified by the evaluator; however, between 6 and 58% of the juveniles were reclassified (Table 4). Reclassification changed the estimated percentage of juveniles in the population by only 0.3% for any one year, except 1997 (which changed by 1.5%), primarily due to the very low numbers of young.

In some years, the number of birds misclassified by field observers could greatly change the estimate of percentage of juveniles (Table 4). In 1997, for example, we reclassified 34% of the juveniles (34 of 99). On the other hand, we did not reclassify similar numbers of adults and unknowns; only three adults and three unknown-aged birds were reclassified as juveniles. The overall result was a decrease of the original estimate, from 5.3% to 3.8%.

Timing of fledging and unknown-aged murrelets

As adults molt into basic plumage later in the year, juveniles can become indistinguishable from adults. If birds are still fledging as the adult molt is ending, we could be underestimating the productivity of the population. Juveniles

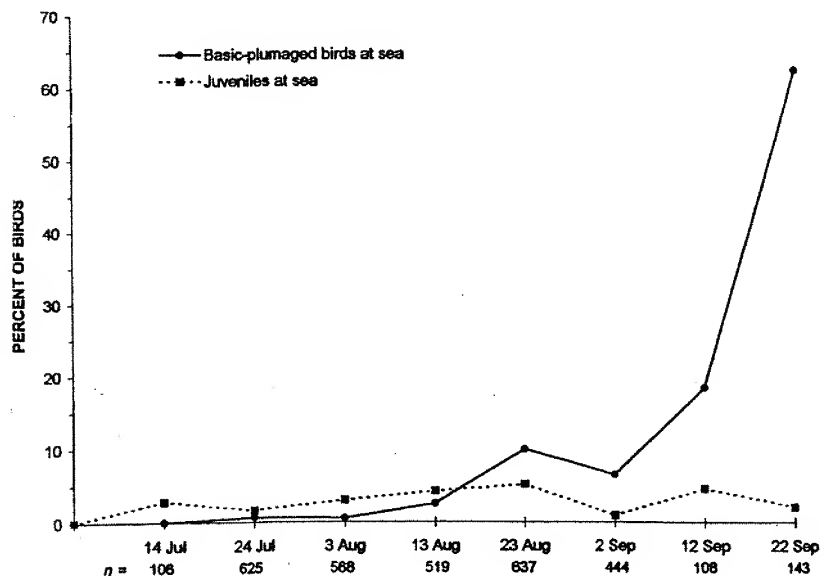


FIGURE 3. Cumulative percentage of basic-plumaged birds (1995-1997) and juveniles (1994-1997) of all murrelets observed at sea in northern California. Basic-plumaged birds consisted of unknown-aged and uncertain birds. Evaluated classifications were used for dark-and-light birds. Date is the beginning of each 10-day period. n = sample size of observations at sea 1995-1997.

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were first seen in mid-July, and comprised $\leq 5\%$ of the population (Figure 3). We were able to age young through late September.

In late July, we found the first basic-plumaged murrelets we were unable to age ($<1\%$). These birds were usually classified as unknown-aged because of inadequate information on the bird or poor viewing conditions. Throughout August, about 5% of the population was unknown-aged birds, until late August when the proportion increased to 10%. After mid-September, unknown-aged basic-plumaged birds made up 70% of the population.

Calculated upper and lower percentage boundaries—For 1994 and 1997, the upper boundaries were 13.1% and 16.9%, increases of 6.3% and 13.1%, respectively (Table 2). This was due to a high percentage of unknowns (6–13%) in September in these years. By contrast, the upper boundaries in 1995 and 1996 (7.7% and 3.6%) were much lower.

Adjusted percentages from regression model—The resulting adjusted percentages of juveniles for each year ranged from 2% to 10% (Table 2).

DISCUSSION

Estimates of Marbled Murrelet productivity rely on the ability of observers to age birds correctly at sea. Our method of collecting plumage data allows for independent evaluation of observations to reduce observer variability. We can also track the timing of adult pre-basic molt, which may change between regions or years, and can influence an observer's classification of murrelets. Studies that rely only on a determination of age made under field conditions, such as Strong's (1998) method, without gathering information on ageing criteria and observation conditions do not allow for this later evaluation and quality control.

Progression and timing of molt in adults

Understanding molt chronology is essential to ageing birds correctly and

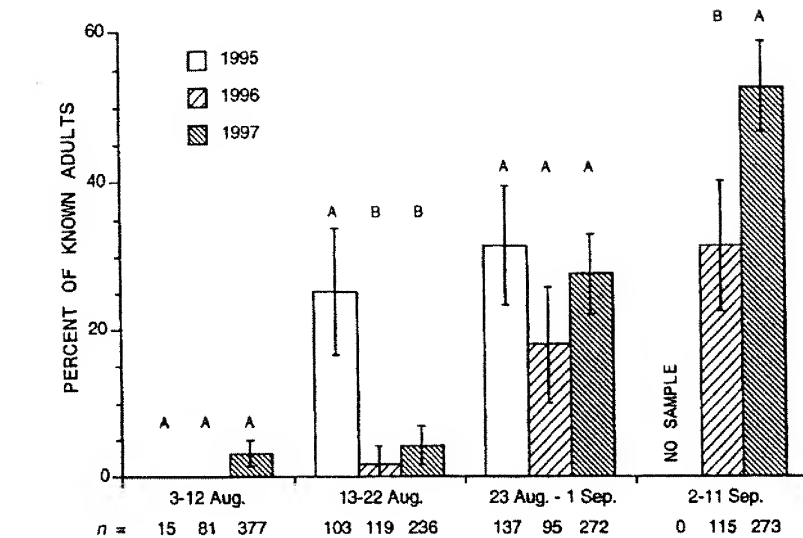


FIGURE 4. Percentage of late molt adults $\pm 5\%$ C.I. by year and 10-day period for 1995–1997. Columns with different letters indicate a significant difference compared to other values in the same 10-day period ($P < 0.05$, z-test). n = number of adults of all molt stages observed.

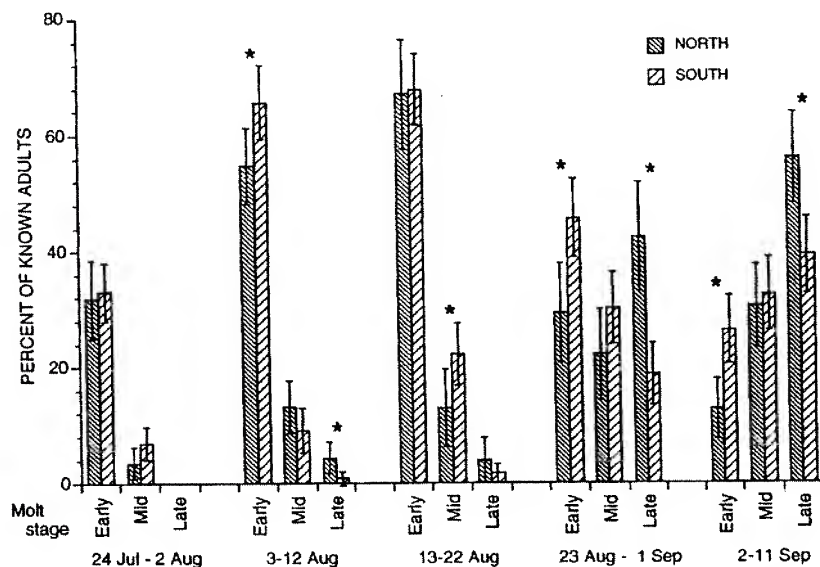


FIGURE 5. Percentage of known adults in three plumage categories by north and south regions ($\pm 5\%$ C.I.) and 10-day periods for 1996–1997 (no data were taken in the northern region for 1995). * $P < 0.05$, z-test.

using time efficiently in the field. We found that dark-and-light birds in July can be aged as probable juveniles, because all adults in our area appear to molt into alternate plumage, unlike in some areas where a few adults remain in basic plumage all year (Kuletz and Kendall 1998).

As the molt progresses, a critical date based on the appearance of the earliest late-molt adults can be specified to begin collecting detailed plumage data on dark-and-light birds. This can make the time in the field more efficient early in the season as less time would need to

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be spent on each bird when juveniles are easily identified. However, because we found some differences in the timing of adult molt between years and regions, we feel that critical dates should not be considered fixed even within a study area. These dates may need to be reassessed yearly for variations in the first or cumulative appearances of adults in late molt. If the dates are to be applied over a large study area, then a more conservative date might be used to avoid misclassification. Most importantly, field crews should be aware of the potential for dark-and-light adults in the late stages of molt to appear early, as well as winter-plumaged adults that did not molt into breeding plumage. Observers should gather adequate data for juvenile identification prior to the earliest records for late-molt adults for the area, in case adults molt early in a particular year.

Reclassification of age categories

We found the potential for incorrectly classifying juvenile birds was high. Between 15% and 50% of juveniles were reclassified as adults or unknown-aged birds when data were reevaluated. The plumage information we collected allowed us to reevaluate the field observations and provided a method of quality control for our age determinations. Studies that rely only on determination of age made under field conditions and without further documentation of ageing criteria do not allow for this evaluation and quality control.

During often difficult field conditions, our method allows observers to concentrate on collecting accurate plumage information on uncertain birds, rather than assessing all potential ageing criteria. By recording the extent of molt in each feather area and the observation conditions, we can later evaluate age determination and potentially reduce the effect of observer variability and the number of misclassified birds. Also, if future

analyses reveal new information on the timing of adult molt, we can reexamine the observations.

Timing of fledging and unknown-aged murrelets

Misidentified juveniles—If juveniles are not identified at the end of the season because they resemble adults in advanced molt, annual productivity will be underestimated. These juveniles may come from (1) juveniles that may be part of the 10% of the “unknown” population in late August (Figure 3) and about 15% of the nestlings remain to be fledged (Hamer and Nelson 1995), or (2) juveniles that fledge after 1 September when adults with completed molt are present. We used two different methods to attempt to adjust for possible missed juveniles: calculated upper and lower percentage boundaries, and adjusted percentage from Beissinger’s (1995) linear regression model. Results from the two methods used to adjust for misidentified juveniles differed greatly. The upper estimate from the calculated confidence limits was always greater than percentages adjusted using the linear regression (Table 2).

Effect of misidentified juveniles—Even though we may be misidentifying up to 50% of the juvenile population, the adjusted percentages in the years of this study still would not result in an overall stable murrelet population according to Beissinger’s (1995) model. He estimated that 15–22% juveniles would be needed to stabilize the population, a 400% increase above our unadjusted yearly average of about 4% (Table 4). The upper confidence limits of only two of four years (1994 and 1997) were near or above the 15% required for stability. This may indicate that, in at least some years, the population could be doing better than unadjusted juvenile percentages would indicate. However, this method assumes that all of the unknown-aged birds in September were juveniles, and that a larger than expected proportion of juveniles fledged late in the season. By contrast, percentages adjusted by linear

regression approached the level needed for stability only in one year, with 10.0% for 1994. Although this is higher than the unadjusted percentages, it still indicates a potentially declining population.

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[This is a peer-reviewed article.]

Table 4. Comparison of observer's evaluation and classification of age by plumage to a later, independent evaluation based on plumage information gathered by observers, 1994-1997. All certainty levels are combined.

Age of bird, as determined by		1994		1995		1996		1997	
Observer	Evaluator	Number	Percent of total ¹	Number	Percent of total	Number	Percent of total	Number	Percent of total
Adult	Adult	753	88.9	359	91.8	672	92.7	1746	81.8
	Juvenile	3	0.4	2	0.5	0	0.0	3	0.1
	Unknown	2	0.2	1	0.3	3	0.4	13	0.6
Juvenile	Adult	1	0.1	1	0.3	6	0.8	1	0.1
	Juvenile	50	5.9	14	3.5	5	0.7	65	3.0
	Unknown	2	0.2	1	0.3	1	0.1	33	1.5
Unknown	Adult	8	0.9	1	0.3	22	3.0	29	1.4
	Juvenile	3	0.4	1	0.3	5	0.7	3	0.1
	Unknown	25	3.0	11	2.8	11	1.5	243	11.4

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4B. Effect of change in classification on estimate of percentage of juveniles observed

	1994		1995		1996		1997	
	Number	Percent of total ¹	Number	Percent of total	Number	Percent of total	Number	Percent of total
<i>Changes in numbers of all age classifications</i>								
Age changed by evaluator	19	2.2	7	1.8	37	5.1	82	3.8
Age remained unchanged	828	97.7	384	98.2	688	94.9	2054	96.2
<i>Changes in numbers of juveniles</i>								
Observer	53	6.3	16	4.1	12	1.7	99	4.6
Evaluator	56	6.6	17	4.4	10	1.4	71	3.8
Change	+3	+0.3	+1	+0.3	-2	-0.3	-30	-0.8
Age changed by evaluator ²	3	5.6	2	12.5	7	58.3	34	34.3
<i>Percent of juveniles³</i>								
Observer	53/811	6.5	16/378	4.2	12/687	1.7	99/1861	5.3
Evaluator	56/818	6.8	17/378	4.5	10/710	1.4	71/1847	3.8
Change		+0.3		+0.3		-0.3		-1.5

¹Total = total number of observations for that year

²Number of juveniles changed to adult or unknown-aged birds. Percentage = (number of juveniles changed by evaluator)/(number of juveniles as aged by observer) X 100.

³Percentage based on known-aged birds only

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Reports provide information on current projects. The information is preliminary and has not been peer-reviewed; therefore it should not be cited without permission from the authors.

CASPIAN TERN PREDATION ON SALMON SMOLTS IN THE COLUMBIA RIVER ESTUARY

Dan Roby, Ken Collis, Don Lyons, Rob Suryan, and Anne Mary Myers

Oregon State University and its co-operators are continuing research on predation by seabirds on salmon smolts in the lower Columbia River. They also are monitoring tern colony size and nesting success in the lower Columbia River, as part of efforts to evaluate management of terns in the Columbia River estuary by federal and state agencies.

Seabirds, including Caspian Terns (*Sterna caspia*), Double-crested Cormorants (*Phalacrocorax auritus*), Western and Glaucous-winged Gulls (*Larus occidentalis* and *L. glaucescens*), and American White Pelicans (*Pelecanus erythrorhynchos*), prey on juvenile salmonids in the Columbia River estuary and lower Columbia River. Some of these fish are listed under the federal Endangered Species Act, and therefore agencies are required to take measures to improve salmonid survival in the river. One focus has been to relocate the principal breeding colony of Caspian Terns in the lower Columbia River, with the aim of reducing predation by terns on salmonids. The tern colony was induced to move from its former site on Rice Island to an artificially-improved site on East Sand Island. The terns have nested successfully at the East Sand site for the past several years.

Participants in the study include Oregon State University, the Columbia River Inter-Tribal Fish Commission, Real Time Research, and US Geological Survey. This year's research team included Dan Roby, Ken Collis, Don Lyons, Anne-Mary Myers, Rob Suryan,

Bobby Begay, Cindy Anderson, Scott Anderson, Michelle Antolos, Sadie Wright, Mike Hawbecker, and a number of seasonal technicians and volunteers. One of the main research objectives in 2002 was to monitor attempts by the interagency Caspian Tern Working Group (CTWG) to maintain the large Caspian Tern colony on East Sand Island. CTWG includes the National Marine Fisheries Service, US Army Corps of Engineers, US Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, Columbia River Inter-Tribal Fish Commission, and others.

Tern management in 2002 was influenced by settlement of a lawsuit brought by conservation groups against the government. On 2 April 2002, Federal District Judge Barbara Rothstein signed a settlement agreement between the plaintiffs (National Audubon Society, Defenders of Wildlife, Seattle Audubon Society, and American Bird Conservancy) and defendants (U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service). The agreement allowed habitat work to begin on East Sand Island to encourage tern nesting, and on Rice Island to discourage tern nesting. It also allowed hazing of terns that attempted to nest in the upper estuary, but only to a limited extent (i.e., prior to egg laying).

In early April 2002, the U.S. Army Corps of Engineers restored about 6.5 acres of bare-sand nesting habitat on East Sand Island, and tern decoys and audio

playback systems were used to encourage terns to nest on the site. Concurrently, work crews from National Marine Fisheries Service, Oregon Department of Fish and Wildlife, and U.S. Army Corps of Engineers flagged roughly 0.5 acres of bare sand habitat at the former Rice Island tern colony. The remaining colony area on Rice Island was completely vegetated and was unsuitable for tern nesting. In late April, the U.S. Army Corps of Engineers hired a crew to haze terns that apparently were prospecting for nest sites on Pillar Rocks, a dredge disposal site in the upper estuary (river mile 27), above Rice Island.

As was the case in the previous year, all nesting by Caspian Terns in the Columbia River estuary occurred on East Sand Island in 2002. The size of the East Sand Island tern colony was approximately 9900 pairs, the largest Caspian Tern breeding colony ever recorded anywhere. The breeding population of Caspian Terns in the estuary has increased since 1997: it increased significantly from 1997 to 1998, remained relatively stable from 1998 to 2001, and once again increased significantly from 2001 to 2002. The terns nested on 4.5 acres, out of approximately 6.5 acres prepared for them, a very similar nesting density compared to 2001. We estimated that roughly 11,000 fledglings were produced at the East Sand Island colony in 2002. This corresponds to nesting success of 1.1 young raised per breeding pair, which was significantly lower than the estimated nesting success at the East Sand

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Island tern colony in 2001. The decrease in nesting success in 2002 as compared to the previous year may have been due to lower availability of forage fishes. This is supported by an increase in the duration of foraging trips in 2002 as compared to the previous year. Another factor that may have contributed to the decline in productivity at East Sand Island in 2002 was a severe storm in late June, which caused considerable chick mortality at the colony. Also, there may have been an increase in gull predation on tern eggs and chicks, due to a decline in availability of alternative foods for nesting gulls. Despite the reduction in productivity between 2001 and 2002, it was higher than ever recorded on Rice Island, higher than at East Sand Island in 2000, and well within the range for other Caspian Tern colonies in North America (0.6 to 1.6 young raised per breeding pair).

Juvenile salmonids comprised 31% of the diet of terns at the East Sand Island colony in 2002, the lowest proportion of salmonids so far recorded for Caspian Terns nesting in the lower Columbia River or estuary. Clupeids (Pacific herring [*Clupea pallasii*] and Pacific sardine [*Sardinops sagax*], northern an-

chovy (*Engraulis mordax*), and surfperch (Embiotocidae) were the most prevalent prey in the non-salmonid portion of tern diets. In 2002, we estimated that Caspian Terns on East Sand Island consumed 6.5 million juvenile salmonids (95% confidence interval = 5.5 to 7.6 million). Consumption of smolts was 5.2 million less than in 1999, when most terns were nesting on Rice Island. The diet composition of Caspian Terns nesting on Rice and East Sand islands suggests that relocating the tern colony to East Sand Island has significantly enhanced survival of juvenile salmonids in the estuary. As predicted, juvenile salmonids were less prevalent and marine forage fishes more prevalent in the diets of Caspian Terns nesting on East Sand Island, compared to terns nesting on Rice Island. The differences in the proportion of salmonids in the diets of Caspian Terns nesting on Rice and East Sand islands are also consistent with the significant inter-colony differences in the diets of other piscivorous waterbirds (i.e., cormorants and gulls) nesting on the two islands. Birds nesting on Rice Island consistently relied more on juvenile salmonids and con-

sumed a less diverse fish diet than birds nesting on East Sand Island. The major difference in diets of Caspian Terns nesting at colonies that are separated by only 13 miles suggests that the terns foraged primarily in close proximity to their nesting colonies in the estuary, instead of commuting long distances to favored or traditional foraging sites. The success of tern colony relocation as a means to reduce consumption of juvenile salmonids was contingent on the terns foraging opportunistically and adapting their foraging behavior to local conditions near the colony.

Editor's note: the saga of the Columbia River terns has been chronicled in this journal for several years: "Conservation News" in *Pacific Seabirds* 25:69, 1998; 26:10, 1999; 26:62, 1999; 27:23, 2000; 27:65, 2000; 28:12, 2001; 28:68, 2001; 29:11-12, 2002; and this issue; and PSG abstracts in *Pacific Seabirds* 27:47, 2000; 28:42, 2001; and 29:36, 51, and 62, 2002.

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SEABIRD BYCATCH IN ALASKAN SET GILLNETS

Kathy Kuletz

For the first time, the US Fish and Wildlife Service (USFWS) joined a study of the National Marine Fisheries Service (NMFS) on seabird bycatch in Alaska's coastal gillnet fisheries. USFWS joined NMFS in summer 2002 for part of the Alaska Marine Mammal Observer Program (AMMOP). The gillnet studies are mandated by the Marine Mammal Protection Act, but they have rotated among fishing areas of Alaska on a limited basis, due to lack of funding. Most of the coastal gillnet fisheries occur within 3 NM (5.5 km) of shore and focus on salmon. Coastal salmon fisheries fall under state management, but NMFS is

still responsible for marine mammals in this zone. NMFS has been monitoring incidental take of marine birds in coastal gillnets to assist in the broader goal of ecosystem management; however, it does not usually collect ancillary data on bird abundance or behavior.

USFWS is responsible for protection of all migratory birds, so it is in the agency's interest to participate in monitoring and evaluating the bycatch of birds in fisheries. NMFS, in cooperation with USFWS, began monitoring seabird bycatch in Alaska's offshore trawl and longline fisheries in 1993 (Rivera et al.

2001). This effort is now being expanded to include fisheries managed by the state.

The first NMFS study of bycatch in Alaska's coastal gillnets focused on the drift gillnet fishery of Prince William Sound in 1990 and 1991 (Wynne et al. 1992). The next study occurred in 1999 and 2000 in Lower Cook Inlet, and results are preliminary (Fadely 2002). In 2002 NMFS began a two-year study of the set-gillnet salmon fishery of Kodiak Island. Depending on available funds (which are not guaranteed), NMFS has scheduled similar studies in Southeast Alaska (2004-2005), the Yakutat area just

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orth of Southeast Alaska (2005-2006), and Bristol Bay (2006-2007).

The driftnet and set-gillnet salmon fisheries of Alaska are extensive, and they are economically important to many coastal communities. Set gillnets in the Kodiak district are up to 150 fathoms (300 m) long, and one end is anchored on shore or in the intertidal zone. Drift gillnets (those towed behind a vessel) are not permitted in Kodiak. Hard data on incidental bycatch are lacking for most regions. Because the fisheries and regions vary tremendously in fishing techniques, habitat, species composition, and abundance of birds at risk, it is necessary to first determine whether there is a problem. We need to know what species are being caught in nets of the different fisheries. The next step is to evaluate bycatch rates relative to bird abundance, habitat, fishing gear, and environmental variables. Eventually, bycatch reduction measures can be tested and implemented, perhaps in ways similar to those in other coastal states (Melvin et al. 2001).

Implementation of the NMFS study was preceded by a year of survey on the fishery itself, to assist in study design and logistics, and by outreach to the fishing community. Principal Investigator Amy Van Atten oversaw development of a comprehensive data collection and data management system. Three USFWS observers (Karen Brennehan, Liz Labunski, and Jacob LaCroix) joined 15 NMFS observers during the June–August season. Observers rotated among randomly selected setnet sites distributed

across northern and western Kodiak Island. They conducted observations from skiffs or support vessels as the gear “soaked” (hung in the water), and later while fishers picked the salmon from their nets. The roles of USFWS personnel were to assist in identifying species of birds, and to collect data on bird abundance and behavior, which should elucidate interactions between birds and nets. To improve background information on local seabirds, they also updated colony counts for the Seabird Colony Catalog along the western and southern coasts of Kodiak Island. Less than 10% of the fishery was observed, and the season was complicated by fishing closures in the southern districts and a strike by set-net fishers early in the season.

The data have not yet been analyzed, but the usual suspects were rounded up—the most common seabird species in bycatch were murrelets, murre, guillemots, and puffins. Approximately 256,000 colonially-nesting seabirds in over 190 colonies have been documented on Kodiak Island, with about 120 of those colonies in or near the NMFS study areas (USFWS 2002). An annual report will be available by early 2003, and the final report will follow the second year of the study. Bryan Manley (West, Inc., Cheyenne, Wyoming) will conduct analyses and serve as lead writer for the report. For details on AMMOP and the Kodiak study, see <http://www.fakr.noaa.gov/protectedresources/observers/mmop.htm>. Preliminary results will also be presented in a poster at the 2003 PSG

meeting (Kuletz et al., “Incidental catch of seabirds in the set-gillnet fishery of Kodiak, Alaska, relative to seabird abundance and distribution in the area”).

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SEABIRDS AND FISHING OFF NORTHWEST EUROPE

Mark Tasker

Many will have read of the disastrous state of fish stocks off northwestern Europe—and of proposals to close several fisheries. After considerable negotiation and discussion, the following appears to be the situation for 2003.

In autumn 2002, the International Council for the Exploration of the Sea (ICES), the main scientific advisors to the European Commission, recommended closure of most fisheries targeting cod off northwestern Europe, and

severe restrictions on any other fisheries that took cod as a bycatch. This follows several years in which the cod stocks had shrunk in size to below “safe biological limits” and insufficient controls had been brought in on fishing. Stocks below “safe

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biological limits" are at high risk of collapse. In addition, similar restrictions were recommended for other stocks in similarly poor states.

Such a recommendation was of course hugely controversial. Those fishers who would be affected by the closures have been particularly vocal in their objections. Interestingly, fishers from Newfoundland, who have been affected by stock collapses on their side of the Atlantic, urged the "pain now, gain later" approach on their eastern Atlantic colleagues.

European fisheries are managed at the level of the European Union. This means that proposals for regulation are generated by the European administrators (the Commission), but decided upon by the European Council—a gathering of the relevant Ministers from each member state of the European Union. Needless to say, politics play a big role at this level. The Commission did not follow the scientific advice, but instead proposed some large cuts, both in terms of total allowable catches (TAC) (really total allowable landings). More importantly, in days of fishing allowed per month were reduced. This latter restriction has never been applied in European waters previously; it has provided a loophole by which it is easier to cheat and has added to pressure on the stocks and environment. The result was a cut by about half in the cod (*Gadus morhua*) TAC, and about a similar reduction in days at sea. Unfortunately, adherence by the Commission to scientific advice is variable—this is perhaps best illustrated with hake (*Merluccius merluccius*), where the scientific advice pointed clearly at closure, but instead there was an 11% increase in TAC! There is, however, no doubt that the incomes of fishers will be affected, nor that sizeable parts of the communities dependent on fishing are going to have to look elsewhere for a living. Quite simply, there are not enough fish to sup-

port the current industry, and recovery cannot occur unless fishing pressure on stocks decreases.

So what might be the effects on seabirds? This is not straightforward, as seabirds diets are very variable, depending as much on food availability as anything else. Northern Fulmars (*Fulmarus glacialis*) are a good example—in the northern North Sea they dominate the scrum of seabirds around trawlers, where they concentrate in particular on offal (rather than discarded whole fish). A decline in landings of large fish means less offal, so we would expect fulmars to be affected. Sure enough, the latest (unpublished) results from counts at UK colonies reveal a levelling off or decline in this species since the last census 15 years ago—and this is a species that has been increasing almost exponentially for 150 years. However, we also know that the amount of their main invertebrate food *Calanus* has also declined, and that their principal summertime prey, sandeel (*Ammodytes marinus*), also have not been thriving near their main breeding colonies. Add to this a likely increase in the numbers of fulmars caught and drowned on longlines over the same period, and it becomes very difficult to distinguish causes of the change in the fulmar population trajectory.

Other species feed more on discarded whole fish (usually undersized, i.e. below the legal size for retention and sale). The number of these discarded each year depends greatly on the profile of the various fish stocks being exploited. Some fish species have intermittent "good" year classes, where many young fish survive early life and begin to grow towards landable size. In other years, the cohort is much smaller. Unfortunately, if fishing continues while such large cohorts are growing, there comes a time when many are caught and killed, but cannot be landed because they are undersized for the market. Precisely this happened

with haddock (*Melanogrammus aeglefinus*; a cod-like fish) in 2001, the most recent year for which we have good statistics. The 1999 year class was particularly good, and consequently a staggering 118,000 tonnes of haddock were discarded, against a 40,000 tonne TAC. Thus in 2001, seabirds feeding on small discarded whole fish would have been well fed! This is one reason why changes in length of the fishing period affects seabird diets, compared with just cutting TACs—less overall fishing means less overall discard.

Discards are however still viewed as "bad." As a consequence, the European Commission has recently published proposals to reduce discarding—including measures such as "land all that you catch." My view is that discards are not necessarily bad—catching the undersized fish in the first place is the real problem. Many larger fish (as well as seabirds) feed on discards, and removing this protein source from the sea (possibly to be returned in elemental form as fertilizer, or via fish farm feedstuffs) is likely to further disrupt marine food webs.

We can be sure that there will be changes in the amounts of waste generated by the fishing industry in northwestern European waters—and it is very likely that this will have consequences for seabirds using this resource. However, since many populations of seabirds increased greatly in the 20th century, maybe such changes should not be viewed in an entirely negative light, so long as fisheries management is progressing towards a more sustainable future.

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LINE-SETTING CHUTE EVALUATED FOR HAWAIIAN FISHERIES

Eric Gilman

Of all the threats to seabirds, one of the most critical global problems is mortality in longline fisheries. The birds get hooked or entangled when gear is being set and are dragged underwater and drown as the fishing gear sinks. Available estimates of total albatross mortality in North Pacific pelagic longline fisheries, along with population modeling experiments on the Black-footed Albatross, highlight the concern that mortality in longline fisheries may threaten the existence of Black-footed Albatrosses and poses a significant threat to Laysan and Short-tailed Albatrosses.

During 2002, a research team assessed the performance of an underwater setting chute to determine if the device is effective at avoiding incidental seabird capture and is practicable for use in the Hawaii longline fishery for tuna (*Thunnus* spp). The project was implemented through the collaboration of the Hawaii Longline Association, National Audubon Society, National Marine Fisheries Service (NMFS), and consultants. Funding was provided by the Hawaii Longline Association, Western Pacific Fishery Management Council, NMFS, National Audubon Society, and US Fish and Wildlife Service.

The underwater setting chute for pelagic longline fisheries was first developed in 1995. It is designed to release baited hooks underwater, out of sight and reach of foraging seabirds. It has been tested in New Zealand, and is currently undergoing trials in Australia's tuna longline fleet. A trial of the chute on a Hawaii tuna longline vessel was completed in March 2002. The chute used for the Hawaii trial is 9 meters long, and when it is deployed, 5.4 meters of the chute's shaft is underwater. The chute has a slot to enable external deployment of the mainline, buoys, and radio beacons.

Results from the short-term trial in Hawaii indicate that the chute will significantly reduce seabird mortality and increase fishing efficiency in the Hawaii

longline tuna fleet. The chute eliminated seabird capture during this short-term trial. During control replicates, the capture rate was 4.24 captures per 1000 hooks, and when normalized for albatross abundance, the seabird catch rate was 0.114 captures per 1000 hooks per albatross. Expressed as contacts per 1000 hooks, the chute was 98% effective at reducing albatross contacts with fishing gear compared to a control. Expressed as contacts per 1000 hooks per albatross (normalized for the average number of albatrosses present), the chute was 95% effective at reducing albatross contacts with fishing gear compared to a control. Based on an assessment of bait retention and hook setting interval when using the chute versus setting with conventional practices, vessels would experience a gain in efficiency of between 14.7% and 29.6% when abundant albatrosses are present, and an increase in efficiency of between 7.5% and 21.5% when no albatrosses are present.

Thirteen of 38 seabirds (34%) observed caught during setting were not hauled aboard, indicating that seabird catch rates based on the number of seabirds recovered during the haul are underestimates.

There was a highly significant linear correlation between albatross abundance and albatross contacts with gear ($r = 0.73$, $P < 0.01$) and captures ($r = 0.53$, $P < 0.001$), which justifies normalizing interaction rates for albatross abundance. Normalizing capture, contact, and attempt rates for seabird abundance allows for more meaningful comparisons between seabird interaction rates observed in different experiments.

There was a highly significant linear correlation between contacts and captures ($r = 0.84$, $P < 0.01$). This implies that research on seabird deterrent methods could be designed so that bait is attached to gear with clips instead of hooks in order to minimize risks of injuring seabirds during research, where observa-

tions of contacts could be used to calculate capture rates under control and deterrent treatments. Further analysis could be conducted to determine the best fit for modeling these relationships.

Globally, most longline vessels probably do not employ effective seabird deterrents, despite the availability of effective technology that also increases fishing efficiency. Reasons for this may be low industry awareness of the availability, effectiveness, and practicability of these seabird deterrent methods; poor management framework, including limited resources for enforcement; or lack of a strong economic incentive to change long-standing fishing practices. Seabird mitigation methods that can be demonstrated to significantly increase fishing efficiency, such as the underwater setting chute, have the highest chance of being accepted by industry as they provide a strong economic incentive for voluntary compliance.

The underwater setting chute is the most effective technology tested to date in the Hawaii pelagic longline tuna fishery to minimize seabird capture, and the chute has the added benefit of increasing fishing efficiency, even in the absence of albatrosses. We are optimistic that the chute offers an effective and practicable solution to manage interactions between seabirds and the Hawaii longline fleet. Additional research and commercial demonstration of the underwater setting chute in the Hawaii longline tuna fisheries are planned during 2003; we also expect to start tests in the longline swordfish (*Xiphias gladius*) fishery, which uses shallower sets.

To receive a copy of the project Final Report, please contact Eric Gilman, National Audubon Society (ericgilman@earthlink.net.).

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CONSERVATION NEWS

Compiled by Craig Harrison

CALIFORNIA FISH AND GAME TENTATIVELY LISTS XANTUS'S MURRELET AS ENDANGERED

In April 2002, the Pacific Seabird Group submitted a petition to list the Xantus's Murrelet (*Synthliboramphus hypoleucus*) as an endangered species under California law (Pacific Seabirds 29:10, 2002). In October, the California Fish and Game Commission held a public hearing and granted the petition, thereby accepting the species as a candidate for state listing. The Department of Fish and Game has one year to further evaluate the status of Xantus's Murrelets and determine if the action is warranted. During the candidacy period the murrelet will be treated as a state listed species.

The Commission also adopted emergency regulations for the take of Xantus's Murrelets during the candidacy period. To reduce nighttime disturbance from light and noise near breeding colonies, the regulations authorize incidental take of Xantus's Murrelets from nighttime (dusk to dawn) vessel operation in the Channel Islands, provided that vessels comply with the following conditions. From February 1 to July 15, within one nautical mile of Santa Barbara and Anacapa Islands, vessels may not engage in night fishing or night diving, may not use external loud speakers on vessels, must remain within designated anchorages or safe harbors except when transiting, and must limit their lighting to navigational lights necessary for safe operations. In addition, researchers studying Xantus's Murrelets must submit project progress reports to the Department.

PENTAGON EXEMPTED FROM MIGRATORY BIRD TREATY ACT

In November, Congress enacted compromise legislation designed to provide the Defense Department a broad exemption from the 1918 Migratory Bird Treaty Act, which protects approximately 850 species of birds from harmful practices. The act is only a partial victory for the Pentagon, which had sought exemptions from eight environmental laws, including the Endangered Species Act, Clean Air Act, Clean Water Act and Marine Mammal Protection Act, on the grounds that compliance with these statutes interfered with military training exercises. The agreement effectively allows bombing on 25 million acres of military-controlled land, which is habitat for millions of migratory birds. The measure was contained in the \$393-billion defense authorization bill, which approves funds for a variety of military programs. The Interior secretary must, within a year, promulgate regulations that will permanently exempt military readiness activities from the Migratory Bird Treaty Act. Those rules must include provisions that require the military to take appropriate actions to avoid killing or harming migratory birds, and to monitor the effect of this exemption.

As reported previously (Pacific Seabirds 29:10, 2002), the Migratory Bird Treaty Act had caused the Pentagon a headache since March, when a federal court ruled that the military must comply with the act. The Center for Biological Diversity had sued to enjoin naval bombing exercises on Farallon de Medinilla, an uninhabited 200-acre island in the Northern Mariana Islands. Among the birds killed during that training were Micronesian megapodes (*Megapodius laperouse laperouse*, an

endangered species), Great Frigatebirds (*Fregata minor*), Masked Boobies (*Sula dactylatra*), Red-footed Boobies (*Sula sula*), and Brown Boobies (*Sula leucogaster*).

This summer the General Accounting Office (GAO), the investigative arm of Congress, found little evidence that to support the Defense Department's contention that environmental "encroachment" on training bases has hurt training. The Navy's Admiral William J. Fallon said environmental litigation has restricted training. He also said environmental groups use the Migratory Bird Treaty Act as "a vehicle for regulating a wide range of activities that affect nearly every species of bird." Opponents of revising the environmental laws said they recognize the importance of military readiness, but too much has been made of Farallon de Medinilla. Senior military officials point to examples of how environmental laws are affecting military activities. Protecting the California Gnatcatcher (*Poliophtila californica*) threatens the continued use of a weapons station at the naval range on San Clemente Island off southern California. Managing 14 "critical habitats" for various species is limiting the places where soldiers can camp, fire weapons, and dig at Fort Bragg in North Carolina. "It is true we have not documented any environmental degradation" of the military's ability to train, said the Army's General John M. Keane, "but we all know it's true." The GAO recommended that the Defense Department form a plan to obtain better documentation of the problem of environmental encroachment on military training ranges.

BLACK RATS ERADICATED ON ANACAPA ISLAND

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The restoration of the Channel Island ecosystem in California is a high conservation priority for PSG. Xantus's Murrelets and Ashy Storm-Petrels (*Oceanodroma homochroa*) seem threatened at every life stage by alien black rats (*Rattus rattus*) on their colonies. PSG supported the National Park Service's project to remove black rats last year, including supporting comments when the project was challenged by animal rights groups in federal court. Phase I of the project was concluded in autumn 2001 and has apparently been a great success on East Anacapa Island. Impacts on migratory birds have been even less than anticipated, murrelet breeding success has already increased, and the endemic deer mouse population (*Peromyscus maniculatus anacapae*) has not been harmed. This summer PSG commented positively on the draft Migratory Bird Treaty Act permit to take migratory birds as part of Phase II of this project, which would attempt to eradicate rats from Middle and West Anacapa Island. This project has garnered the attention of the national press as a stand-off between conservation groups that focus on traditional wildlife management and animal-rights activists who believe that this type of project is misguided or even "animal racism." Fortunately for Xantus's Murrelets, they trump black rats in the Park Service's view.

PSG COMMENTS ON SQUID FISHERY PLAN

Thanks to Bill Sydeman, PSG filed comments in July with the California Department of Fish and Game on a draft management plan for the commercial fishery on the market squid (*Loligo opalescens*). The draft plan is comprehensive and includes information about ecologically dependent species in the California Current System, including seabirds. PSG noted that scientific studies document the importance of market squid as food for most seabird species, particularly during fall and winter when

squid comprises 50-80% of the diets. In addition, under environmental conditions such as moderate El Niño events, or when other prey such as juvenile rockfish are unavailable, seabirds may switch to squid even during the breeding season and consume it as 30 to 60% of their diets. The long-term viability of seabird populations depends on their ability to forage on market squid during fall and winter, and to be able to switch to market squid during the breeding season during times of food stress.

PSG emphasized that the market squid fishery fluctuates in relation to environmental variability, especially as evidenced during El Niño (low availability) and La Niña (high availability), when squid are either rare or abundant. Because of the boom and bust nature of the squid fishery, PSG recommended that fishery managers should set yields so that market squid are not over-fished during periods of scarcity. For this reason, PSG objected to allowing catches equal to the maximum landings during cold-water La Niña conditions such as those in 1999-2001. PSG urged the state to implement precautionary fisheries management and to drastically reduce landings during El Niño events.

PSG also reminded the department of PSG's concerns with respect to the effects of lights from the squid fishery on threatened and endangered seabirds that nest on the Channel Islands. Lights may have been responsible for the loss of Brown Pelicans (*Pelecanus occidentalis*) on Anacapa Island and Xantus's Murrelets on Santa Barbara Island in 1999. PSG reiterated its suggestion to close this fishery within one mile of sensitive colonies during the breeding season.

HABITAT CONSERVATION PLAN FOR KAUAI SEABIRDS

The U.S. Fish and Wildlife Service (USFWS) is applying for a grant to prepare a habitat conservation plan (HCP)

for seabirds on Kauai under the Endangered Species Act, in cooperation with the Hawaii Division of Forestry and Wildlife. The grant would allow the State of Hawaii to hire a coordinator to facilitate an island-wide, programmatic HCP to minimize and mitigate the seabird take associated with urbanization. Concerns include power lines and cell phone towers; birds hit these structures and fall to the ground ("fallout"), especially if they are disoriented by lights. Kauai Electric, the local utility company, has agreed to apply for an incidental take permit through development, funding, and implementation of a HCP for seabird take related to its power lines and facilities. Kauai Electric is working with USFWS to identify interim conservation measures while the power line HCP is being developed; the company has already implemented some measures to minimize impacts, and has conducted some preliminary surveys. If the grant to the State of Hawaii is awarded, the utility's power line HCP will likely be included in an overall, island-wide approach. There are provisions for public comment on draft HCPs before they are issued.

GAO RECOMMENDS THAT U.S. FISH AND WILDLIFE SERVICE COMPLETE CRITICAL HABITAT GUIDANCE

The GAO has stated that the USFWS should issue guidance for designating critical habitats to protect endangered species. The report concluded that USFWS's inconsistent process for determining critical habitat makes the agency vulnerable to lawsuits. The report, entitled "Endangered Species Program: Information on How Funds Are Allocated and What Activities Are Emphasized" (GAO-02-581) can be found at <http://www.gao.gov>.

The investigators also concluded that if USFWS spent less time responding to litigation, this would help reduce backlogs in the program and allow the

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agency to conduct other listing activities, such as reviewing listing petitions and adding species at the greatest risk of extinction. Recovery is the ultimate mission of the endangered species program, and this goal receives almost half of the program funds, yet employees state that they spend much less time on recovery of endangered species. Instead, their time is spent consulting with other federal agencies over federally funded activities that could jeopardize the existence of threatened or endangered species.

REVAMP THE NATIONAL ENVIRONMENTAL POLICY ACT?

This summer the Council on Environmental Quality issued a Federal Register notice requesting comment on means to "improve and modernize" the National Environmental Policy Act (NEPA). A task force was formed to "seek ways to improve and modernize analyses and documentation and to foster improved coordination among all levels of government and the public." NEPA, enacted in 1970, requires any federal agency that is contemplating a major action to first complete an environmental impact statement (EIS). The public must have an opportunity to comment on proposed actions before they are undertaken.

Some environmental groups think that this seemingly innocuous task force signals an assault on NEPA. For example, the Interior Department, reacting to some disastrous forest fires this summer, proposed a forest protection plan that would waive some NEPA requirements for logging programs. In addition, the Navy is refusing to undertake analyses of the environmental impacts of its use of a sonar technology on marine mammals and other aquatic life that may be harmed by the technology.

Industry has commented that regulatory changes are needed to ensure that NEPA is implemented in a fair and timely manner. For example, it was suggested

that there be time limits for completion of environmental assessments and EISs, and that constraints be imposed on the number of pages in EISs and the number of alternatives that can be included. Some industry participants complained that the "short form" environmental assessments have become almost as lengthy, time-consuming, and expensive to prepare as full-blown environmental impact statements. One suggestion was to allow applicants to prepare draft environmental impact statements for agency review and possible adoption, which currently is not allowed.

Among the larger concerns that surfaced is the contention that cumulative impact analysis has been taken to extremes, including the evaluation of impacts far afield from the project. In addition, the strategy of adaptive management, which allows approval of an action with an uncertain environmental outcome if accompanied by environmental parameters and monitoring, has subjected some projects to an open-ended regulatory process that is never concluded.

STORM WATER THREATENS SEABIRDS IN ALAMITOS BAY, LONG BEACH, CALIFORNIA

The City of Long Beach is planning to funnel its storm water into Colorado Lagoon, which is the terminus of Alamitos Bay and is the last remaining near-natural wetland in Long Beach. With very constricted tidal flushing between the lagoon and Alamitos Bay, the amount of runoff during heavy rains is projected to overwhelm the bay's hydrology and alter the marine ecosystem. Brown Pelicans and California Least Terns (*Sterna antillarum*) feed in Alamitos Bay, together with a myriad of other shorebird and seabird species. Even without an increased amount of polluted street runoff entering the lagoon, the current tidal gate system needs to be updated

and expanded so that the lagoon can have better flushing.

Friends of Colorado Lagoon, a grassroots group, is suggesting alternatives; these can be seen at <http://www.coloradolagoon.org/>. The lagoon already has a problem with low oxygen content and algal overgrowth because of the restricted flushing to the ocean. Additional runoff would pour petroleum byproducts from streets into the lagoon, forming an oily layer on top of most of it.

—Patricia Baird

NMFS RELEASES FLAWED CASPIAN TERN PREDATION REPORT

The National Marine Fisheries Service (NMFS) released its report entitled "Caspian Tern Predation on Salmon and Steelhead Smolts in the Columbia River Estuary." The report can be seen at <http://www.nwr.noaa.gov/1habcon/habweb/default2.html>. Ignoring most of PSG's comments on its draft report, NMFS concludes that Caspian Terns (*Sterna caspia*) are inhibiting the recovery of listed salmon species and steelhead. NMFS concludes that eliminating the tern colony at East Sand Island would yield similar population recovery to dam passage or harvest restrictions. The report assumes that there is no compensatory mortality, so that there is a direct relationship between the number of smolts saved from terns and the number of returning adults—an assumption that has generated considerable controversy within the scientific community.

USFWS ISSUES DRAFT SITE FEASIBILITY STUDY FOR CASPIAN TERNS

In late October, USFWS completed a draft site feasibility study for new Caspian Tern colonies in the Pacific Northwest. This study was required by

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deral government's settlement
ment with conservation organiza-
who had sued over the
ment's failure to prepare an envi-
ntal impact statement (Pacific Sea-
27:65, 2001 and 27:23, 2000). The
t can be seen at [http://
atatorybirds.pacific.fws.gov/
s_new.htm](http://atatorybirds.pacific.fws.gov/s_new.htm). The study describes 76
and asks for public comment on
might be the most feasible. After
ents have been evaluated, USFWS
hooose sites and experimental man-
ent actions, which will be imple-
ed in 2003 and 2004. This is a sen-
process; statements by the National
ie Fisheries Service and some fish-
roups have created a negative cli-
which may encourage strong op-
on from local fishermen, and they
ry to block any efforts to establish
colonies or restore old ones.

COMMENTS ON US REPORT ON STATUS ASSESSMENT AND CONSERVATION OF CASPIAN TERNS

USFWS has released its "Status
ssment and Conservation
mmendations for the Caspian Tern
orth America," which may be seen
[p://pacificbirds.fws.gov](http://pacificbirds.fws.gov). Thanks to
d Ainley, PSG commented on a draft
e report. It is an impressive review
he status, conservation, and
agement issues for this species. We
d that the US breeding population of
38 pairs is not very large on a
inental scale, and that the Pacific
t population (14,534 pairs) may be
numerous than the federally-
angered Brown Pelican. Among
s conservation recommendations is
gional survey or analysis to show (1)
orical breeding sites, (2) sites
ently used, and (3) what needs to be
e to insure a well-distributed regional
ulation (i.e., public acquisition of
e sites and social attraction at others).
i also suggested research on meta-
ulation dynamics and demography, in

order to define better what constitutes a
Caspian Tern "population."

NEW OFFSHORE OIL AND GAS LEASE PLANS

The Interior Department has laid out
a five-year program to tap offshore oil
and gas fields in the United States, an-
nouncing drilling opportunities in the
western Gulf of Mexico and expanded
opportunities offshore of Alaska. The
lease sale program would make available
10-21 billion barrels of oil and 40-60 tril-
lion cubic feet of natural gas—enough
oil to fuel every commercial and private
vehicle in the US for up to five years,
and enough gas to heat and cool and run
appliances for every US home for three
years.

The plan relies on the Gulf of
Mexico to produce the most of the fuel.
Alaska environmentalists have objected
to drilling in the Cook Inlet and the
Chukchi Sea. The Chukchi Sea is thought
to hold 61 trillion cubic feet of natural
gas that is recoverable using conven-
tional methods. Although petroleum
companies have declined to enter into
leases there in the past, the offer is being
extended again in hopes that the possi-
bility of an Arctic gas pipeline will lure
them in. Local communities have ex-
pressed concern about expanded drilling
in the Chukchi Sea, but officials say they
have taken special care to exclude sensi-
tive areas. There is a new leasing ap-
proach in the Chukchi Sea, Hope Basin,
and the Norton Basin to meet such con-
cerns. Under that approach, a sale will
be allowed only if a company nominates
an "environmentally acceptable" tract. If
no such tracts are nominated, the sale will
be postponed one year and the process
will start again.

OCEANIC FLYWAY WORKING GROUP

PSG members Kent Wohl and Tara
Zimmerman went to Raratonga, Cook
Islands, this summer to discuss creation
of an oceanic flyway. The goal would be
better management of Bristle-thighed
Curlews (*Numenius tahitiensis*), other
shorebirds, and seabirds. The meeting
was convened by South Pacific Regional
Environmental Programme (SPREP).
One result was the proposed creation of
a World Heritage Site of Central Pacific
Islands and waters spanning thousands
of miles. It would include Palmyra Atoll
in the north, Kiritimati (Christmas Island)
in the middle, and one of the northern
Cook Islands at the southern end.

PREDATOR REMOVAL ON OCEANIC ISLANDS

Dick Anderson of the South Pacific
Regional Environmental Programme and
New Zealand Department of Conserva-
tion has surmounted many obstacles to
eradicate Pacific rats (*Rattus exulans*)
from an islet on Kiritimati, Kiribati
(Christmas Island, Pacific Ocean). A
major colony of Phoenix Petrels
(*Pterodroma alba*) there was in danger
of extirpation (Pacific Seabirds 29:14,
2002). Another New Zealander, Brian
Bell of Wildlife Management Inc., has
been working with his team at Ascension
Island in the Atlantic to eradicate cats.
Bell reports they are down to the last wily
felines at this historically important sea-
bird colony.

RATS AND SEABIRDS ON KISKA ISLAND, ALASKA

PSG member Ian Jones has devel-
oped a website detailing his team's work
at Kiska Island to determine the levels
of Norway rat (*Rattus norvegicus*) pre-
dation and impacts to the gigantic auklet
colony there. The URL for the site is
[http://www.mun.ca/acwern/
Kiska2002.html](http://www.mun.ca/acwern/Kiska2002.html).

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CONFERENCE PROCEEDINGS AVAILABLE: ERADICATING INVASIVE SPECIES

"Turning the Tide: The Eradication of Invasive Species" presents 424 pages of papers from a conference. The volume, edited by Dick Veitch and Mick Clout, contains 52 papers and 21 abstracts.

The book can be obtained by mail from: Dick Veitch, 48 Manse Road, Papakura, New Zealand; e-mail dveitch@kiwilink.co.nz. Veitch's international phone/fax number is 64-9-298-5775; within New Zealand, dial 09-298-5775. The cost is NZ\$55.00. Postage is additional; sample postage costs are: New Zealand \$5.00, Australia NZ\$31.00, USA NZ\$35.00, UK NZ\$55.00. Payment in New Zealand dollars must reach Veitch's address before 31 March 2003.

Payment can be made by Mastercard or Visa. Each order should include a postal address.

The volume may also be purchased from IUCN Publications Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, United Kingdom; their international phone number is 44-1223-277894, fax 44-1223-277175, e-mail books@iucn.org. They should have stocks by the end of January 2003. Details are on IUCN's web page at <http://www.iucn.org/bookstore>.

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PACIFIC SEABIRD GROUP MEETING 19-22 FEBRUARY 2003

The Pacific Seabird Group will hold its 30th meeting in beautiful Parksville, British Columbia at Tigh-Na-Mara Resort (the name is Gaelic for "by the sea") from 19 through 22 February 2003. The meeting will feature a symposium on Seabird Biogeography, and there will be three plenary speakers: David Cairns, Helen James, and Robert Ricklefs. There will be field trips to Mount Arrowsmith Biosphere Reserve, Baynes Sound, Carmanah Rainforest, and an ocean tour to the Winchelsea/Ballenas Archipelago. Parksville is located on Vancouver Island, 30 minutes north of Nanaimo and 2 hours north of Victoria by road. Visitors can fly to Vancouver, Victoria or Seattle and take the BC or Washington State ferry systems to Nanaimo or Victoria. The meeting will take place at

the resort. There are many choices for accommodation, ranging from rustic log cabins to executive suites; most have kitchenettes and fireplaces. Accommodation will be assigned on a first-come-first-served basis. There is also a fine restaurant at the resort. To reserve accommodation, contact the resort directly. The web site for Tigh-Na-Mara is www.tigh-na-mara.com; e-mail info@tigh-na-mara.com; telephone (800) 663 7373.

To register for the conference online, follow the links under upcoming events at www.sfu.ca/biology/wildberg. Early registration (before 16 January 2003) is Can\$200.00 for regular members and Can\$100.00 for student members. Late registration (after 15 January 2003) will be Can\$250.00 for regular members and Can\$125.00 for student members. (Note that all fees are in Canadian dollars.) Lunch is included with the registration fee. Student travel awards are available (see the web site). For those who wish to register offline, the appropriate forms can

be obtained from the web site and sent to Shelagh Bucknell, Canadian Wildlife Service, 5421 Roberston Rd., R.R. #1, Delta, B.C. V4K 3N2, Canada. The deadline for abstracts is 1 December 2002.

For information regarding the scientific program contact Dr. David Irons (907) 786 3376; email David_Irons@fws.gov. For general information or inquiries, refer to the web site or contact Shelagh Bucknell at (604) 940 4642; e-mail shelagh.bucknell@ec.gc.ca. We look forward to seeing you at the 30th meeting in Parksville, BC.

FROM THE EDITOR: CHANGES IN PACIFIC SEABIRDS

Pacific Seabirds is undergoing a few changes, some of which will be notice-

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able and others not. The fall 2002 issue is the first to be produced with Adobe PageMaker, a dedicated desktop-publishing program. This program should have several advantages: the firm that prints the journal can make plates directly from my documents, which should reduce PSG's printing costs; it will make the process of laying out each issue quicker and more flexible; and it may facilitate putting *Pacific Seabirds* on our Web site. All this should make the switch to PageMaker worthwhile (although I've wondered at times, as my learning curve for this issue has stretched on...)

Hopefully the journal will look essentially the same. The published pages may look slightly different; for some obscure reason, switching layout programs also meant I had to switch fonts, from "Times New Roman" to "Times."

One change that is being discussed by the Executive Council is publishing *Pacific Seabirds* on the Web. Many would probably like to see the journal on our Web site. The big question is whether electronic publication should *replace* the hard-copy version you receive in the mail. What is your preference? Please let the editor or your regional representative know—your opinion may determine what we decide.

A note on the content of *Pacific Seabirds*: I believe that the fall 2002 issue is

an example of what this journal does best. It contains a peer-reviewed article and four short reports, all on topics of current interest to seabird biologists of the Pacific Rim. I would like to continue this balance in the future. The reports by Gilman and by Roby et al. were originally in regional reports, but they seemed long and complete enough to merit publication on their own (after extra editing and another review by the authors). The article by Linda Long et al. deals with techniques of particular interest to seabird scientists and conservationists on the Pacific Coast, which is exactly the type of manuscript that *Pacific Seabirds* welcomes. (Articles of primary interest to a national or international readership are directed to *Marine Ornithology*, the journal that PSG publishes jointly with the African Seabird Group.)

A few remarks to *Pacific Seabirds*' contributors: First, thank you to all authors and regional representatives who sent material—*Pacific Seabirds* depends on you. Second, please continue sending material in Microsoft Word, which is great for editing, even though it's temperamental for layout. (I can translate from other programs, however.)

And I'd like to request full disclosure of your professional secrets: please provide the scientific name for each spe-

cies and the full name behind each acronym. Even if "everyone" knows what WAES or a Bosun Bird is, editorial standards say that the journal has to provide a definition or Latin name. It is no trouble to delete this information if I don't need it, but it can take a lot of time and effort to track it down!

—Vivian Mendenhall

ISLES OF REFUGE WINS AWARD

The Hawai'i Book Publishers Association has honored Mark Rauzon's *Isles of Refuge: Wildlife and History of the Northwestern Hawaiian Islands* with one of its Ka Palapala Po'okela Awards for 2002. The award was given on 18 October at the Hawai'i State Library in Honolulu. *Isles of Refuge* won the award in the category for Excellence in Writing Nonfiction. The book also received honorable mention in two additional categories: Excellence in Natural Science and Excellence in Illustration.

Isles of Refuge was reviewed in *Pacific Seabirds* 28:104 (2001).

REGIONAL REPORTS

Regional reports summarize seabird work of interest to PSG members. Reports generally are organized by location of the work rather than by affiliation of the biologist.

ALASKA

Summarized by Verena A. Gill

BEAUFORT AND CHUKCHI SEAS

In September **Bob Day** of Alaska Biological Research Inc. (ABR), aided by **John Rose**, **Alice Stickney**, **Julie Parrett**, and **John Shook**, used ornithological radar and night-vision equipment to conduct a second year of studies of bird migration and development of an anti-collision lighting system for migrating birds, especially eiders, at Northstar Island, a man-made oil-production island near Prudhoe Bay. **Betty Anderson** of ABR completed the 10th year of research on Spectacled (*Somateria fischeri*) and King eiders (*S. spectabilis*) in the Kuparuk Oilfield in Northern Alaska. In addition to aerial and ground-based surveys to determine population trends and nesting success, time-lapse cameras and temperature thermistors were used to monitor incubating females and record predation events. **Charles (Rick) Johnson** (ABR) continued his long-term monitoring studies of Spectacled and King eiders on the North Slope of Alaska, on the Colville River Delta (11 years) and in the National Petroleum Reserve-Alaska (3 years). Study components included aerial surveys for breeding pairs and broods, nest searches, and monitoring of nesting success. ConocoPhillips, Inc supported these studies. **Bob Ritchie** and **Jim King** (ABR) completed their 4th year of aerial surveys for Steller's (*Polysticta stelleri*) and Spectacled eiders near Barrow, Alaska. **Bob Ritchie** also conducted searches for nesting Steller's and Spectacled Eiders at several Long Range Radar Sites on the North Slope for the U.S. Air Force. **Steve Murphy** and **Charles (Terry) Schick** (ABR) returned for a second year of aerial and

ground surveys for Spectacled and Steller's eiders at coastal and inland sites for Anadarko Petroleum, Co.

Jim Lovvorn's group from the University of Wyoming continued studies of wintering Spectacled Eiders; see the report for the non-Pacific US.

Dave Roseneau and **Jim Schneeweis** continued Alaska Maritime National Wildlife Refuge (AMNWR)'s annual monitoring of seabirds nesting at Cape Lisburne in July and August.

BERING SEA

The Gambell and Savoonga Native Corporations cooperated with **David Irons** of the United States Fish and Wildlife Service (USFWS), and **Dan Roby** of Oregon State University (OSU) to monitor seabirds on St. Lawrence Island. **Adrian Gall** and **Lisa Sheffield** arrived in Savoonga on June 17, 2002 and joined **Brandon Waghiyi** for the third season of fieldwork. **Victor Zubakin** (victor@zubakin.msk.ru), visiting ornithologist from the Russian Academy of Sciences, arrived from Moscow on June 20th. The St. Lawrence crew monitored population indices and productivity of Black-legged Kittiwakes (*Rissa tridactyla*), Common Murres (*Uria aalge*), and Thick-billed Murres (*U. lomvia*) on established plots 10 km west of Savoonga. It was difficult to determine precise fledging success for the cliff nesters due to raging 50-mph winds that buffeted the plots for four days during peak fledging. The crew also monitored colony attendance, breeding success, and diet composition of Least Auklets (*Aethia pusilla*) and Crested Auklets (*A. cristatella*) at the Kitnik colony 4 km east of Savoonga. Breeding adults during the laying and early incubation period were collected to

determine body composition. **Zubakin** evaluated methods for counting auklets from June through August. The auklet research will contribute to the Seabird Monitoring Database and be used for **Gall's** MSc thesis. **Gall**, **Sheffield**, **Waghiyi**, and **Zubakin** were invited by teacher **Brad Billings** to speak with his 10th grade life and earth science classes at Hogarth Kingeekut Memorial School. Students learned to collect morphometric data from frozen birds.

Also on St. Lawrence Island, **Bob Day** of ABR, assisted by **John Rose** and **Julie Parrett**, used ornithological radar and night-vision equipment to study movements and collision potential of Spectacled Eiders and other sea ducks at Gambell. during October.

Mary Cody (USFWS) and **Steve Rice** of the Alaska Department of Fish and Game (ADF&G), with assistance from **Joe Meehan** (ADF&G), **April Alexei** and **Tim Dyasuk** (both student interns with the Bristol Bay Native Association) monitored Black-legged Kittiwake, Common Murre, and Pelagic Cormorant (*Phalacrocorax pelagicus*) populations and productivity at Round Island in the Walrus Islands State Game Sanctuary. **Rice**, with assistance from **Meehan**, completed his third field-season investigating Northern Raven (*Corvus corax*) predation on these seabird species at Round Island.

Art Sowls (AMNWR) led biologists in various projects on Hall Island (in the St. Matthew Group) during July. Work included 8-day census plots for Black-legged Kittiwake, Thick-billed Murre, Common Murre, Northern Fulmar (*Fulmaris glacialis*), and Pelagic Cormorant. Crew members were **Anne Morkhill** and **Martha Hatch** (AMNWR), **Paula White** (University of

REGIONAL REPORTS – Alaska

California at Berkeley), **Scott Hatch** and **Verena Gill** of the U.S. Geological Survey, Alaska Biological Science Center (ABSC), and **Alexander Kitaysky** of the University of Washington (UW). **Kitaysky** will move soon to the University of Alaska Fairbanks (UAF). AMNWR also continued the Seabird Marine Mammal and Oceanography Coordinated Investigations (SMMOCI) by surveying Norton Sound. This project includes recording seabird distribution at sea around annual monitoring sites, with simultaneous surveys of sea temperature, salinity, and biomass of prey. This year they surveyed transects near Nome with a large crew that included **Don Dragoo**, **Vernon Byrd**, **Jeff Williams**, **Doug Palmer**, **Barry Sampson**, **Karen Boylan**, **Gary Drew**, **John Piatt**, **Deb Rudis**, **Brenda Holladay**, **Kitty Mecklenburg**, **Mike Palmer**, and **Alan Springer**. In addition, **Byrd** and **Dragoo** surveyed seabirds on refuge islets in Safety Sound and at Topkok Head near Bluff. **Springer** and **Piatt** also collected blood samples from Bluff birds for a wide-ranging survey of stress in seabirds being conducted by **Kitaysky**. **Ed Murphy** from UAF monitored numbers and breeding performance of murres and kittiwakes at bluff briefly in midseason.

AMNWR staff continued long-term monitoring projects on the Pribilof Islands from May until late August. The monitoring program includes collecting data annually on timing of nesting events, reproductive success, adult survival, chick growth, and food habits. **Art Sowls**, **Becky Howard**, **Jim Snowden**, **Tonia Bittner**, and **Naomi Sugimura** conducted studies on St. Paul Island. **Heather Moore**, **Will Boyd**, and **Julie Snorek** were on St. George Island from May until August. In addition, **Lisa Scharf** and **Dave Kuehn** spent July on St. George helping conduct population counts of ledge nesting seabirds, which are carried out every three years.

Seabird surveys were conducted during a short visit to Bogoslof Island in July. **Art Sowls**, **Anne Morkill**, **Jeff Williams**, **Martha Hatch**, and **Debbie Rocque** (AMNWR), **Scott Hatch** and

Verena Gill (ABSC), **Alan Springer** (UAF), **Alexander Kitaysky** (UW), and **Judy Alderson** of the National Park Service (NPS) conducted stress hormone work with murres and kittiwakes, evaluated reproductive success of kittiwakes, and surveyed Tufted Puffin (*Fratercula cirrhata*) plots for a population trend index.

ALEUTIAN ISLANDS

Staff at the AMNWR continued their annual monitoring work on several Aleutian Islands. **Jeff Williams** led seabird work on Kasatochi and Buldir Islands. Field crews on Kasatochi Island included **Sarah Syria** and **Allison Stover**, and those on Buldir included **Erica Sommer**, **Trevor Joyce**, and **Nikolai Konyukhov** (konyukhov@gol.ru). **Konyukhov** continued his studies of diurnal and seasonal patterns of colony attendance in the Parakeet Auklet (*Aethia psittacula*) and Horned Puffin (*Fratercula corniculata*) on Buldir Island from 26 May until 4 September. This year observations were focused on Horned Puffin attendance patterns. A digital time-lapse camera was placed at last year's plot. During the incubation period, Horned Puffins began to attend the breeding colony by 0800 and numbers gradually increased throughout the day until about 1900, when a peak in attendance began. This peak lasted until about 2300. During the chick-reading period puffins also had a similar pattern; however, with the shortening of daylight hours, the morning presence at colonies became later and the evening peak earlier.

Dennis Wynn and **Debbie Dykstra** conducted seabird population and productivity work on Aiktak Island from May until September. Introduced Arctic foxes (*Alopex lagopus*) were removed from Adak Island in the central Aleutians. Tanaga and Amlia islands were searched for sign of foxes that might have survived earlier eradication efforts. The fox projects were conducted this year by AMNWR employees **Steve Ebbert**, **Greg Thomson**, and **Lisa Scharf**, with the assistance of a crew from the U.S. Department of Agriculture, Wildlife Ser-

vices: **Sherman Anderson**, **Rick Ellis**, **Gerald Masolini**, **Peter Masolini**, **Jerry Morrill**, **Joseph Orsini**, **Dave Sinnett**, **David Sonneborne**, **Jon Spiegel**, and **David Tresham**. A tour of Shemya, Kiska, Rat and Kavalga Islands was conducted by **Art Sowls**, **Ebbert**, and **Peter Donlevy** for **Steve Talbot**, **Karen Murphy**, EPA registration specialists **Bill Jacobs** and **William Erikson**, and **Gregg Howald** of the Island Conservation and Ecology Group. The trip served as a workshop to plan rodent eradication for the conservation of seabirds on these and other infested refuge islands. **Ian Jones** and **Heather Major** also participated. A previously undetected colony of roof rats (*Rattus rattus*) was discovered on Shemya Island during this trip. A pre-fox removal bird survey was conducted at Avatanak Island. **Vernon Byrd**, **Jeff Williams**, **Steve Ebbert**, **Catherine Berg**, and several Aleut interns from Unalaska conducted seabird and terrestrial bird surveys.

GULF OF ALASKA

AMNWR staff initiated an annual monitoring project on Chowiet Island in the Semidi group. A new cabin was constructed on Chowiet to facilitate the long-term seabird monitoring program on that island. This year's field crew was on Chowiet from early May through mid September, and included **Shiway Wang**, **Dave Oleszczuk**, and **Allyson Larned**. **Wang** began collecting prey and subcutaneous fat samples from fulmars and puffins for a possible graduate research project involving fatty acid signature analyses. **Arthur Kettle**, **Greg Thomson**, **Rachel Orben**, and **Amy Baton** conducted seabird monitoring on East Amatuli Island in the Barren Islands group from late July through early September. **Steve Ebbert** of USFWS and **Aren Eddingsaas** of Idaho State University collected Arctic ground squirrels (*Citellus parryi*) from Chowiet, Chirikof, Cold Bay, Kodiak, Ugashat, Unalaska, and Kavalga Islands. These specimens will be used to understand the distribution of ground squirrels on refuge islands, and to resolve questions about where this

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species was introduced during the Russian occupation of Alaska or later. Work began on removing over 1000 wild cattle from Chirikof Island this year for the restoration of that island for seabirds. **Tim Jacobson** of Herd Management LLC built corrals and fences to facilitate the live capture and shipping of cattle by September 2002.

Scott Hatch, **Verena Gill**, **Naomi Bargmann** (ABSC) and a sizable supporting cast (**Christy Hand**, **Brooke Krolick**, **Rick Milligan**, **Marie-Line Gentes**, **Marcia Tierney**, and **Liz Boldt**) continued seabird research and monitoring on Middleton Island in 2002. Supplemental feeding of Black-legged Kittiwakes at the tower colony continues, but the birds show declining interest in our offerings, as Mother Nature is setting a better table each spring in the northern Gulf of Alaska. For 6 weeks in June-July, the crew hosted **Julien Gasparini** (Université Pierre et Marie Curie, Paris, France), who investigated the immunocompetence of fed and unfed kittiwake chicks.

University of Alaska Fairbanks researchers **Loren Buck**, **Dean Kildaw**, and MS students **Katie Murra** and **Brook Gamble** conducted a second season of seabird studies in Chiniak Bay on Kodiak Island. Their research is one component of the multi-disciplinary Gulf Apex Predator-Prey project (GAP). The work is coordinated with synoptic hydroacoustic, trawl and nearshore assessments of prey availability headed by **Robert Foy** (UAF), and with research on marine mammals lead by **Kate Wynne** (UAF). GAP seabird research is focused on productivity, diets, and nestling growth of Black-legged Kittiwakes, Tufted Puffins, and Glaucous-winged Gulls (*Larus glaucescens*). In collaboration with **David Irons** and **Kent Wohl** (USFWS, Migratory Bird Management), GAP initiated a program to monitor the at-sea distribution of marine birds, in addition to continuing long-term population and productivity monitoring efforts of cliff-nesting kittiwakes, cormorants and murres in Chiniak Bay. **Katie Murra's** MS project addresses the influ-

ence of diet and foraging areas (determined via radiotelemetry) on kittiwake breeding biology. MS student **Brook Gamble** collected preliminary data on Glaucous-winged Gulls this summer and will refine her research interests over the winter. **Cory Williams** was a member of the field crew this past summer and will join the project as a new Ph.D. student in 2003 to work with Tufted Puffins.

A preliminary summary of the Chiniak Bay seabird story is as follows: Productivity of kittiwakes, Glaucous-winged Gulls, and puffins in Chiniak Bay was exceptionally high in 2001, but less so in 2002. Sandlance (*Ammodytes hexaptera*) and, to a lesser extent, capelin (*Mallotus villosus*) dominated the diet of all three species in 2001. In 2002 capelin were more prevalent in the diets of all three species, but less feeding activity was observed within the confines of the bay. These observations suggest that near-shore sandlance schools were less abundant within the bay in 2002, and that birds foraged farther from breeding colonies where they encountered more capelin. Data analysis is in progress.

Also on Kodiak, **Shawn Stephensen** (USFWS) led a trip to the western coast of the island and offshore islets to survey tern (*Sterna* sp.) colonies. He was assisted by **Denny Zwiefelhofer** (Kodiak National Wildlife Refuge) and **Leslie Slater** (AMNWR).

USFWS, with funding from the Species at Risk (SAR) program managed by **Tony DeGange**, sponsored two surveys to update counts of Kittlitz's Murrelets (*Brachyramphus brevirostris*). This work repeated surveys of in the early 1990s in two separate areas of the Gulf of Alaska: the southern Kenai Peninsula and the outer Yakutat-Malaspina Forelands. The Kenai Fjords survey covered 25% of the fjords coastline, including Kenai Fjords National Park. It was led by **John Piatt** and **Tom VanPelt** (ABSC), with help from **Jane Reid** (University of British Columbia), **Nadine Parker** (Simon Fraser University), and **Jared Figurski** (PISCO). The Forelands survey included about 80 km of exposed coast, and added intensive coverage of Icy Bay, which is

surrounded by ice fields northwest of the Forelands. The Forelands/Icy survey was a multi-agency effort. Two offices of USFWS participated: Migratory Bird Management, Anchorage (**Kathy Kuletz**), and Southeast Alaska Ecological Services, Juneau (organized by **Michelle Kissling** and **Steve Brockman**, with assistance by **Debra Rudis** and **Ed Grossman**). They were joined by **Mason Reid** of the Wrangell-St. Elias National Park, which surrounding much of that coast, and **Debra Nigro** of Yukon-Charlie National Park, which generously allowed her to contribute her murrelet expertise. Data collected at both Kenai Fjords and the Malaspina Forelands showed declines in Kittlitz's Murrelets, which is consistent with apparent trends in Prince William Sound and Glacier Bay. On the positive side, Icy Bay harbored an unusually high density of Kittlitz's Murrelets, equivalent in estimated population (~2200 birds) to current estimates for Prince William Sound and Glacier Bay. Next summer, USFWS and the NPS hope to survey the coast south of Yakutat to Cross Sound (near Glacier Bay), the last large expanse of glacially-affected coast bordered by two known "hot spots" of Kittlitz's Murrelets.

Suzann Speckman is continuing her PhD work under the supervision of **Julia Parrish** (UW) and **John Piatt** (ABSC). She is examining how bottom-up forcing, as mediated through forage fish prey, influences seabird distribution and abundance in lower Cook Inlet.

In collaboration with the Institute of Oceanology (Polish Academy of Sciences), **Ann Harding** and **Tom Van Pelt** (ABSC) led the "Little Auk Expedition 2002" to Spitsbergen to study Dovekies (Little Auks; *Alle alle*). See "Old World" for details.

Verena Gill recently took a new job with USFWS, Marine Mammals Management, where she will be working on sea otters (*Enhydra lutra*). She remains very interested in seabird issues and plans to stay involved in PSG.

PRINCE WILLIAM SOUND

Biologists of the Chugach National Forest, Cordova Ranger District, **Paul**

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Meyers and Nick Osterberg, conducted boat-based marine bird surveys on the north end of Montague Island from Zaikof Point to Port Chalmers. Surveys were conducted within 2 hours of high tide for all waterbirds within 200 m of shore. In addition, the team searched for all nests of Black Oystercatchers (*Haematopus bachmani*), terns, gulls (*Larus* spp.) and Pigeon Guillemots (*Cephus columba*). Unfortunately, no Pigeon Guillemot nests were found.

David Irons with the aid of Kelsey Sullivan, Aly McKnight and several others continued long-term monitoring of Black-legged Kittiwake populations, productivity, diets, and survival in Prince William Sound. Sullivan (an MS student at Rutgers University) and McKnight came back for a third year to conduct studies at the Shoup Bay kittiwake colony in Prince William Sound. Sullivan is looking at the effect of adjacent productivity on the rate of movement of experienced breeders. This year the Shoup Bay colony was visited repeatedly by a wolverine (*Gulo gulo*), which fed on Glaucous-winged Gull and Black-legged Kittiwake chicks.

Rob Suryan (Oregon State University) continues to work with data from studies on the *Exxon Valdez* oil spill. He is producing final drafts of synthesis products and additional analyses that will be used as part of his graduate work.

SOUTHEAST ALASKA

Bob Day of ABR is working on an environmental impact statement for the Vessel Management Plan at Glacier Bay National Park and Preserve. He conducted analyses and is writing the bird section of the document. In 2003, John Piatt (ABSC) and others will initiate studies of Kittlitz's Murrelet ecology in Glacier Bay National Park. This work will include studies funded by USGS, the NPS, and ADF&G on habitat use, foraging behavior, and impacts of vessel disturbance. In related projects, Mike Litzow and Mayumi Arimitsu completed a second year of forage fish surveys in Glacier Bay, with capable assistance from Kyle Juk and Brad Congdon

(James Cook University, Australia). Arimitsu and Juk then went on to assist Suzann Speckman (UW), Chris Gabrielle (Glacier Bay National Park), and Mike Shultz in a continuing study of marine predators and forage fish in Glacier Bay.

Staff from AMNWR continued seabird monitoring at St. Lazaria Island from May to September. This work was led by Leslie Slater with returning crew Vicky Vosburg and Anissa Berry-Frick. Additional field assistance came from Deborah Rocque, Kassy Holzheimer, and Laura Borg.

South of Juneau, USFWS (Michelle Kissling, Mike Jacobson, Patti McDonnell), assisted by Gus VanVliet and Paul Suchanek, surveyed 5 mainland fjords for Kittlitz's Murrelets this year. They found low numbers in Holkham Bay and Endicott Arm, but not in the southern bays. The data provided an update on the southern breeding range of the species.

SEABIRD BYCATCH ISSUES

The USFWS Office of Migratory Bird Management in Anchorage received a second year of congressional funding (\$575,000) to work on seabird bycatch issues in Alaska. Kathy Kuletz and Kent Wohl worked with USFWS's Western Alaska Ecological Services (WAES; Ann Rappoport and Greg Balogh), the National Marine Fisheries Service (NMFS; Kim Rivera) and fishing industry representatives (Thorn Smith of the North Pacific Longline Association, and many others). The project directed funds to 7 on-going and 3 new projects focused on education/outreach, mitigation devices, and assembly of data on seabirds at risk. Summaries of the projects, agency and university investigators, and their progress to date can be obtained from Kathy Kuletz (kathy_kuletz@fws.gov). In brief, on-going projects included: (1) production of a video on seabird mitigation devices for fishers, (2) support for the North Pacific Pelagic Seabird Database, (3) satellite telemetry tracking of Short-tailed Albatross (*Phoebastria albatrus*), (4) demographics and genetic

profiling of albatross and northern fulmars taken incidentally during longline fishing (see report below), (5) development of a database for fishery observer sightings and notes, (6) improved training for fishery observers on seabird issues and identification, and (7) purchase and distribution of streamer lines to fishers. New projects initiated in 2002 included: (1) field testing of a prototype weighted sink line for longline fishing, (2) field tests of bycatch reduction devices on small vessels, (3) collaboration with NMFS on their gillnet bycatch study on Kodiak Island (see report elsewhere in this issue).

Rob Suryan continues to work with Dan Roby (Oregon State University) on telemetry of the Short-tailed Albatross. This project is being conducted jointly with the Japanese Ministry of the Environment (Naoko Nakajima), USFWS (Greg Balogh, Kent Wohl), and the Yamashina Institute for Ornithology (Kiyooki Ozaki, Fumio Sato). The purpose of the study is to identify post-breeding dispersal routes of subadult albatrosses, environmental variables that affect their at-sea distribution, and potential conflicts with commercial fishing fleets. We were successful in acquiring good data from four of the nine birds tagged—2.5 to 4 months of data, with over 1,400 locations. These birds exhibited two distinct dispersal strategies and used at least four primary regions for feeding in waters of Japan, Russia, and the United States. We hope to deploy 10 transmitters each in 2003 and 2004. Additional participants in this study include David Hyrenbach (Point Reyes Bird Observatory), David Anderson (Wake Forest University), and Paul Sievert (University of Massachusetts and USGS).

Kathy Kuletz and Kim Rivera updated the seabird section of the Ecosystem Considerations chapter of the Alaska Groundfish Fisheries EIS. They continue to work with the North Pacific Fisheries Management Council on seabird issues. They also are working on the latest draft of the Environmental Impact Statement for management of Alaska's groundfish

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fisheries, evaluating potential impacts from alternative management scenarios. **Karen Brenneman** and **Liz Labunski** pored through 8 years of fishery observer notes and sighting forms from the groundfish fisheries, to compile the new Observer Notes Database. **Brenneman** and **Labunski**, joined by **Jacob LaCroix**, also worked on the NMFS bycatch study on Kodiak Island. The USFWS crew assisted in seabird identification, collected data on seabird-gear interactions, and updated seabird colony counts (see report by Kuletz elsewhere in this issue). Earlier in the year, **Brenneman** and **Labunski** conducted winter boat-based surveys in Southeast Alaska. The latter were designed to ground-truth the aerial waterbird surveys conducted by the Juneau office.

Scott Hatch and **Verena Gill** (ABSC) completed the first full field season of a study to identify the origins of Northern Fulmars taken as bycatch in Alaskan long-line fisheries. The approach includes both satellite telemetry and the development of genetic markers for fulmars from each of the four main Alaskan colonies—Semidi Islands, Chagulak Island, Pribilof Islands, and St. Matthew/Hall islands. Five satellite transmitters were deployed (one at Chagulak in June and four at Hall Island in July), and all birds were doing fine and sending data as of mid-September. They also obtained blood samples for genetic analysis from Chagulak, Hall Island, and both St. George and St. Paul in the Pribilofs. During the year, **Gill** went to school in the USGS Alaska Science Center's Molecular Ecology Lab to learn the basics of DNA extraction and PCR, and she has been tutoring **Hatch** in the same process. Let the record show that **Hatch** managed to visit each of the "big four" fulmar colonies in a single season this year, a personal "grand slam" of considerable significance.

Kim Dietrich is characterizing seabird bycatch rates in Alaska longline fisheries. The research is her MS thesis work under **Julia Parrish** (UW) and **Ed Melvin** (Washington Sea Grant). She is

modeling bycatch rates as a function of fisheries, environmental factors, and seabird ecological factors in order to explain the spatial and temporal variation in these bycatch rates. She is also working with **Shannon Fitzgerald** of the NMFS Groundfish Observer Program, to identify individual longline vessels for outreach activities that will be performed by NMFS staff.

BACK AT THE OFFICE (ENDANGERED SPECIES, DATABASES...)

David Irons (USFWS) and **John Piatt** (ABSC) continued work on the North Pacific Pelagic Seabird Database, joined during the summer by **Michelle St. Peters**. **Scott Hatch** reports that the Pacific Seabird Monitoring Database is about ready to go public, software having now been prepared for both data entry and data retrieval on-line. Internet security issues in the Department of Interior have caused some delays but should be resolved in the near future. **Irons** and **Kent Wohl** continue to represent the US at the Circumpolar Seabird Group (CBIRD) meetings. CBIRD continues to be involved in many projects and has recently completed the Circumpolar Murre Banding Database. **Ann Harding** completed her MSc thesis, "Breeding ecology of Horned Puffins in Alaska" at the University of Durham, England, and finished analyses and reports on a study of Horned Puffin attendance patterns and monitoring protocols. **Greg Balogh** of USFWS, WAES in Anchorage organized the first Short-tailed Albatross (*Phoebastria albatrus*) recovery team (START) meeting in Kauai, Hawai'i in November 2002. This was in conjunction with the International Fisheries Forum and involved agencies and individuals from the USA, Japan, and Australia. **Kathy Kuletz** is updating the Kittlitz's Murrelet Status Report began last year. She also worked with **Greg Balogh** to compile data and write the Kittlitz's Murrelet Candidate Assessment, a step towards proposed listing under the Endangered Species Act. The assessment, which was sent out for ex-

ternal review this spring, was revised and will be submitted this fall following internal review.

RUSSIA

Summarized by **Nikolai B. Konyukhov**

Maria Ushakova (kurilsky@ostrov.sakhalin.ru) studied the biology of Rhinoceros Auklets (*Cerorhinca monocerata*) and Tufted Puffins (*Fratercula cirrhata*) at the Kurile Islands. In 2002, most research activities were done on Rogachev Island (44°07' N, 146°02' E), but some of them were completed at Dyomin Island (43°14' N, 146°03' E) from May to September. This was Maria's first year of studies to collect data for her PhD thesis.

Larisa Zelenskaya (larisa@ibpn.kolyma.ru) carried out studies at Talan Island (59°11' N, 149°03' E), in the Sea of Okhotsk. **Olga Nos** also participated in studies of Black-legged Kittiwake (*Rissa tridactyla*) breeding biology, monitoring populations that have been studied since 1987. They also studied several plots established in 1955 where only observation of birds without any disturbance was conducted. Chick growth was monitored at other plots. Weather conditions were normal during 2002 breeding season. Egg-laying dates were normal for this population and the proportion of non-breeders was lower than in previous years. Mean clutch sizes were comparable to previous years. Both 3-egg clutches and re-laying were observed. Environmental conditions may have changed during incubation. Hatching success was lower than usual, and hatched chicks had a low rate of mass gain. Seventy-five percent of chicks under observation died during their first 10 days and none of them lived past their 20th day. All kittiwakes (inside and outside plots) failed completely, possibly because of starvation. Proportions of capelin and sandlance in food samples were less than usual. Predation pressure was normal.

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Nikolai Konyukhov (konyukhov@gol.ru) and **Victor Zubakin** (victor@zubakin.msk.ru) did field work in Alaska again in 2002. Konyukhov continued his studies of the Parakeet Auklet (*Aethia psittacula*) and Horned Puffin (*Fratercula corniculata*) on Buldir Island in the Aleutian Islands. Zubakin monitored kittiwakes, murres (*Uria* spp.) and auklets (*Aethia* spp.) on St. Lawrence Island, Bering Sea. Further details are in the regional report for Alaska.

CANADA

Summarized by **Ken Morgan**

WESTERN CANADA (EXCEPT MARBLED MURRELETS)

Carina Gjerdrum (former MSc student, Simon Fraser University) is currently working in the Department of Ecology and Evolutionary Biology at the University of Connecticut (Storrs, Connecticut) where she is studying salt marsh birds. In her spare time she is analyzing Tufted Puffin (*Fratercula cirrhata*) data, which include 14 years of reproductive data from Triangle Island, British Columbia, spanning 1975 to 2000. Gjerdrum, together with co-authors Anne Vallée (deceased), John Ryder, Colleen Cassady-St. Clair, and Doug Bertram, are interested in the consequences of warm waters on the reproductive performance of Tufted Puffin. The data show that especially warm sea-surface temperatures are associated with decreased growth rates and fledging success of puffin nestlings. Future plans for Gjerdrum include three months in Antarctica during the upcoming austral summer, where she will study the population dynamics of Adélie Penguins (*Pygoscelis adeliae*).

Mark Hipfner of the Canadian Wildlife Service (CWS) reports that the past summer marked the 9th year of the joint seabird research and monitoring program by CWS and Simon Fraser University (SFU) on Triangle Island. This is the second year of the program under his direc-

tion. Hipfner and others, including **Kristin Charleton** and **Laura MacFarlane-Tranquilla** (according to Mark, “both led a very capable and enthusiastic field crew”) continued to monitor breeding chronology and success, nestling diets, and chick growth in Cassin’s Auklets (*Ptychoramphus aleuticus*), Rhinoceros Auklets (*Cerorhinca monocerata*), Tufted Puffins, and Common Murres (*Uria aalge*). In addition, they used radiotelemetry to determine at-sea foraging distributions of Rhinoceros Auklets during chick-rearing. This last project relates to planning for the Scott Islands Marine Protected Area. Although Tufted Puffins experienced another year of very poor success, most species fared well this summer. Two SFU students conducted MSc research at Triangle Island in 2002. **Gwyllim Blackburn** finished his second year of field work investigating sexual selection and parental investment decisions in Tufted Puffins. **Eric Davies** finished his first year of field work investigating seasonal changes in trophic status of the alcids breeding at Triangle using stable isotopes. As part of the CWS seabird monitoring program, Hipfner visited several islands in the Queen Charlottes this summer. He assisted in banding of Ancient Murrelets (*Synthliboramphus antiquus*) at Limestone Island, which was being carried out by the Laskeek Bay Conservation Society, led by Jo Smith (Birdsmith Ecological Research). Hipfner also visited Langara Island, along with **Gregg Howald** (Island Conservation Group), and **Valerie Lebreque** and **Bob Milko** (CWS); they found no signs of rats, but did find some suggestive evidence that seabird populations may now be responding to the rat eradication program of the mid-1990s. In addition, Hipfner, Lebreque and Milko visited Ramsay Island to re-survey the Ancient Murrelet and Cassin’s Auklet plots there.

Beth MacCallum (Bighorn Environmental Design, Hinton, Alberta) reports on several years of Harlequin Duck (*Histrionicus histrionicus*) surveys. A spring and summer survey of the

McLeod River and its tributaries was undertaken in 1995, as part of an Environmental Impact Assessment for the Cheviot Mine project of Cardinal River Coals Ltd.. In 1996 a detailed study was initiated with the purpose of documenting Harlequin Duck distribution, abundance and use on the McLeod River system. That study was continued in 1997, 1998, and 1999. Information was used to develop a six-part management plan to mitigate the impacts of the Cheviot Mine development. A long term monitoring program was developed as one component of the management plan. The primary means of monitoring the population is to conduct a late May survey to establish breeding potential and a late August survey to establish productivity prior to migration. Mark-resighting techniques are used to estimate the number of adults present in the spring, and repetitive instream foot surveys are used to establish the number of broods in late August. Between 1996 and 2001, the McLeod River population of Harlequin Ducks has varied from 58 ± 7 (mean \pm SD) to 68 ± 2 adults; the population appears stable.

Ken Morgan (CWS, Sidney, British Columbia) is using ships of opportunity to collect pelagic data on high trophic-level organisms, as part of a joint project led by **Bill Sydeman** (Point Reyes Bird Observatory) and **David Hyrenbach** (Duke University Marine Lab). The goal is to identify highly productive marine areas within the California Current, for potential designation as Marine Protected Areas (MPA). Over the past year, Morgan has also been an active member of the North Pacific Albatross Working Group. He is also on the Marine Advisory Committee to identify Marine Species of Common Conservation Concern. This is part of a MPA initiative undertaken by the Commission for Environmental Co-operation, a component of the North American Free Trade Agreement between the USA, Mexico and Canada. Morgan is also collaborating with **Sonia Batten** (Sir Alister Hardy Foundation for Ocean Science), **David Welch** of the Department of Fisheries

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and Oceans (DFO), **Sydeman**, and **Hyrenbach** on the Constant Plankton Recorder project, which links near-surface planktonic abundance and community composition with marine birds and mammals between British Columbia and Japan. And finally, **Morgan** is the lead for British Columbia in assessing the extent, timing, location and variability of chronic oil pollution in offshore and nearshore waters. The CWS has hired **Patrick O'Hara** as a post-doc to work on this issue; his "advisory committee" includes **Morgan**, **Mark Hipfner** (CWS), **Alan Burger** of the University of Victoria (UVIC), **John Dower** (UVIC), and **Bill Crawford** (DFO). The findings of O'Hara's work will be essential to derive estimates of the background oiling of seabirds; those data may be vital to making informed decisions regarding the possible lifting of the moratorium on oil and gas exploration and development within Canada's Exclusive Economic Zone off the British Columbia coast.

Spencer Sealy (University of Manitoba, Winnipeg) reports that he is working on a project more than 30 years old called Studies of Vagrancy in Auks. In the late 1970s Sealy began compiling inland records of Ancient Murrelets in North America. **Harry Carter** (US Geological Survey, Dixon, California) soon joined as a collaborator and the work has progressed over the years in several stages, broken by intermittent and sometimes lengthy periods of inactivity as each pursued other research. But this work was never forgotten, and in the fall of 1999 Sealy and Carter resumed compiling and updating records. The work has expanded over the years to include several other species: Marbled Murrelets (*Brachyramphus marmoratus*) (inland use of freshwater lakes); long-distance vagrancy of Long-billed Murrelets (*Brachyramphus perdix*); vagrancy in North Pacific auklets; and movements (including long-distance inland movements) and wrecks of Dovekies (*Alle alle*) of the Atlantic Ocean. Specimens from many museums have been examined; data have been recorded for each

specimen, including locality, date, age, sex, and whatever information is available from sight records. Interpretations of the analyses are being couched in terms of each species' natural history, oceanic features and climate.

Joanna Smith (Birdsmith Ecological Research) returned to the Queen Charlotte Islands in March for her fourth season with Laskeek Bay Conservation Society (LBCS). The camp on Limestone Island was staffed from 29 March to 7 July by **Jen Rock**, **Charlotte Tarver** and **Smith**. The long-term monitoring program for Ancient Murrelets, Marbled Murrelets, Black Oystercatchers (*Haema-topus bachmani*) and other marine life in Laskeek Bay is in its 13th year. Twenty-seven volunteers helped out over the season. The LBCS and **Tony Gaston** (CWS) cooperated with **Vicki Friesen** (Queen's University) to collect blood samples from songbirds. Friesen and two students (post-doctoral fellow **Theresa Burg** and MSc student **Roger Bull**) are investigating whether the resident songbirds on islands are genetically distinct from mainland populations. **Smith** will be leaving her numerous Canadian projects in the fall to begin a PhD with **Julia Parrish** and **Chris Thompson** at University of Washington, where she will be investigating seabird predation on salmon on the Columbia River, Washington

MARBLED MURRELETS

Alan Burger of the University of Victoria (UVIC) is continuing research on Marbled Murrelets (MAMU) and other seabirds on Vancouver Island. Field work in 2002 focused on radar surveys for murrelets in southwestern Vancouver Island, in collaboration with **Bernard Schroeder** and assistant **Laura Cassin**. Counts of murrelets made with radar will be compared with GIS data to determine landscape-level habitat associations. Radar surveys were undertaken to assess the risks to murrelets of wind turbine generators, whose construction is proposed on a ridge top in northern Vancouver Island. **Burger** also worked with **Stewart**

Guy of the British Columbia (BC) Ministry of Water, Land and Air Protection, **Louise Waterhouse** (BC Ministry of Forests), **Brian Smart** (Smart Forest Planning) and others in the development of standardized methods for assessing murrelet habitat from helicopters, following GIS and air-photo analysis. **Burger** is also working with **Christine Hitchcock** (University of British Columbia) and **Gail Davoren** (Memorial University of Newfoundland) to analyze the distribution and oceanography of seabirds over the continental shelf to the southwest of Vancouver Island, using multi-year data collected during the 1990s.

Burger analyzed data from beached bird surveys in British Columbia from 1987 through 1997; a report is available. A new beached bird survey program has been initiated in British Columbia, run by **Jeanne Roy** (Bird Studies Canada).

A retired (?) **Fred Cooke** is now "relaxing" in Norfolk, United Kingdom, but says that he still finds plenty to keep him busy, including an honorary research position at the University of East Anglia. **Cooke** is still keeping up with the Marbled Murrelet work being done at SFU, although most of that is now coordinated by **Dov Lank** (SFU). The main Marbled Murrelet work this year at SFU's Centre for Wildlife Ecology has been examine nesting habitat preferences. **Cooke** states that the analysis of nests found by radiotelemetry at Desolation Sound, British Columbia (81 nests) showed that the birds had a clear preference for old growth forests located at 600 to 1000 m and on steeper slopes. They also showed a preference for natural edges and small forest patches, in contrast to previous findings using classical nest-finding techniques. **Cooke** also reports that this year they have collected more data from Clayoquot Sound in order to get an adequate sample from the more pristine site. Preliminary results indicate that at that location there also is a preference for higher elevations and steeper slopes. **Cooke** suggests that previous guidelines for habitat protection for murrelets in British Columbia need to be

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vised, if maximal nest-site protection is to be achieved. Results also show that juveniles move north along the Pacific Coast, rather than in a southerly direction as previously assumed. The direction of movement of adult birds is still being investigated.

Falk Huettmann (University of Calgary) investigated Marbled Murrelet nesting habitat in Desolation and Clayoquot Sounds (British Columbia), with **Mryka Hall-Beyer** and **MGIS student Scott Steeby** (University of Calgary). They used LANDSAT 7 satellite imagery and are working on a method for classifying the imagery (6 spectral bands and 30-m pixel size) to derive and evaluate maps of murrelet nesting habitat. Random habitat field-plot data were applied to images from August 2000 as a basis for classification of forest types. In addition, old-growth forest classifications were compared with nesting habitat, determined by more than 120 nest locations identified from 1998 through 2001 within a 50-km 'foraging' circle. **Peggy Yen** (SFU/Point Reyes Bird Observatory) and **Huettmann** investigated how MAMU marine distribution and abundance related to abiotic and biotic components of the marine environment. Data on marine distribution of MAMU in British Columbia (birds/km² from 1972 to 1993, counts (number of birds per survey; 1922 to 1989), and pertinent environmental variables were entered into Arcview. On a 10-km scale, count surveys were negatively correlated with density surveys. **Huettmann** suggested that the interpretation of the count data (relative abundance) should be done with care. Together with British Columbia Institute of Technology (BCIT), GIS students **G. Burroughs**, **M. Pregitzer**, and **N. Antoniazzi**), together with **Huettmann**, **Yen** and **J. Stoodley** (SFU), initiated a website, "Marbled Murrelet Sightings on Lakes in British Columbia, Canada." The URL is <http://mapserver.geog.sfu.ca/murrelets/>. According to **Huettmann**, the project presents new and interesting conservation, modeling and survey aspects. Among these are the ability to predict the occur-

rence of MAMU on freshwater lakes, based on "presence only" sightings. One can report field sightings via this website, where they are stored and freely available on request.

Paul Jones reports that observations of MAMU continued for the twelfth consecutive year on the Caren Range and the waters of Middlepoint Bight, Sunshine Coast, British Columbia. On the Caren Range, detections were down and three previous nesting sites remained unused in 2002. MAMU counts on the Bight during the molt period were down to 28 birds, compared with 39 in 2001. Only one newly arrived juvenile was observed (July 8). "The Marbled Murrelets of the Caren Range and Middlepoint Bight" is available from **Jones** or from the publisher (Western Canada Wilderness Committee, 227 Abbot Street, Vancouver, BC, Canada V6B 2K7) for Can\$34.95.

Bernard Schroeder (Bernard K. Schroeder Consulting, Nanaimo, BC) with assistance by **Laura Cassin**, conducted MAMU radar surveys for **Alan Burger** (UVIC) between early June and late July. The surveys were carried out in various watersheds located around and southeast of Barkley Sound (Vancouver Island) using a vehicle-mounted 10 Kw radar unit. The work was funded by the World Wildlife Fund as a first year of investigation into measuring populations and distribution of Marbled Murrelets in this area. **Schroeder** also conducted work on a habitat evaluation project in the Klaskish/East Creek and Mahatta Landscape Units on North Vancouver Island for the British Columbia Ministry of Water, Land and Air Protection. Potential MAMU nesting habitat throughout the landscape was delineated and rated using reviews of air-photo and forest cover maps at a scale of 1:20,000. Aerial assessments were conducted using a helicopter as a broad scale ground-truthing method. Land-based radar surveys were conducted to investigate movement and dispersal of Marbled Murrelets through the Klaskish valley and across passes into the Cayuse and Mahatta valleys. The information gathered is being used to prioritize areas for

further investigation and to assist habitat managers with selection of Old Growth Management Areas and Wildlife Habitat Areas.

SEABIRD BYCATCH

Jake Fraser (Fraser Research and Development) and **Joanna (Jo) Smith** (Birdsmith Ecological Research) developed a 2-page color laminated sheet of Pacific coastal seabirds (see report by **Smith** below). **Fraser** requested that he be allowed the following "rant": "Many commercial fishermen are real conservationists and are committed to doing the responsible thing. Fishermen are often thought to be ignorant rapers of the sea. That may be true of some, but many fishermen recognize the value of sustainable ecosystems. A lot of the not-so-aware types have left the industry, thank goodness. Gillnet fishermen have collected information on bird bycatch in their daily logbooks, and several hundred of them paid to attend province-wide workshops on reduction of bycatch, including birds. Manuals for the identification and avoidance of seabirds were distributed to participants at these workshops. Hundreds of fishermen in British Columbia, Washington and Oregon have attended workshops that I have led on selective fishing, and those workshops have included a thorough discussion of the bird situation. The forming of partnerships for the purpose of wildlife preservation [is] very important. The commercial component of those partnerships is key to successful implementation of identification and avoidance programs."

Joanna Smith (Birdsmith Ecological Research) and **Ken Morgan** (CWS) worked with the Halibut Advisory Board and Fisheries and Oceans Canada to develop seabird avoidance measures for the 2002 commercial halibut fishery. Late in 2001, the halibut fishery requested assistance with reducing bird bycatch. With help from **Ed Melvin** (Washington Sea Grant), bird scaring lines were introduced into the halibut fishery as a condition of license—the first mitigation measures for seabird bycatch in British Columbia. Steps to reduce seabird bycatch were

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made in the commercial salmon gillnet fishery as well. Members of the commercial fishery asked for seabird identification materials so that they could avoid those birds most likely to get caught in nets. **Jake Fraser** (Fraser Research and Development) and **Smith** developed a 2-page color laminated sheet of Pacific Coast seabirds, with support from North Coast Selective Gillnet Association, Community Futures Development Corporation, Environment Canada, and Fisheries and Oceans Canada. The sheet was distributed free of charge to commercial salmon gillnet licensees. **Smith** and **Morgan** presented a paper at the American Society of Limnology and Oceanography on the overlap of seabirds and the rockfish fishery, one of the major longline fisheries in British Columbia known to catch seabirds.

Ken Morgan (CWS, Sidney, British Columbia) continues to collect data on seabird bycatch in commercial net and longline fisheries in British Columbia. **Morgan** and (especially) **Joanna Smith** worked with DFO, the observer provider companies, and the fishing industry to raise the awareness of the problem. Steps have been taken by the Pacific Halibut Advisory Board and DFO to ensure that avoidance devices are used on most halibut boats. The observers salvage many of the killed birds; **Morgan**, **Erin Sifton** and **Craig Stephen** (Centre for Coastal Health, Nanaimo, BC) are examining all salvaged birds for diseases, toxins, etc. **Chris Thompson** and **Ken Warheit** (both of the Washington Department of Fish and Wildlife) and **Keith Hobson** (CWS, Saskatchewan) are also making use of various tissues from these birds. In addition, **Morgan**, **John Chardine** (CWS, Atlantic) and **Bob Milko** (CWS, Hull, Québec) continue to collaborate with DFO Ottawa to develop a National Plan of Action for the reduction of seabird bycatch in longline fisheries, in accordance with the Food and Agriculture Organization (FAO)'s international initiative to reduce bycatch **Erin Sifton** and **Craig Stephen** (Centre for Coastal Health, Nanaimo, British Columbia), in conjunction with **Ken Morgan** (CWS)

and **Joanna Smith** (Birdsmith Ecological Research), are currently examining seabirds, primarily Rhinoceros Auklets and Common Murres, from a seabird bycatch salvage program. The intent of this project is to investigate whether seabirds from the salvage program can, over time, act as ecosystem or population health sentinels. The principal investigators, both veterinarians and epidemiologists, perform gross post mortem exams of the seabirds to look for signs of trauma, toxicity, infection, congenital deformities or other abnormalities. Tissue samples are collected for histological examination where further information is required.

EASTERN CANADA

John Chardine (CWS, Sackville, New Brunswick) has been collaborating on studies of nest-site selection in Razorbills (*Alca torda*) with **Tony Diamond** and MSc student **Dedreic Grecian**, both of the Atlantic Cooperative Wildlife Research Network (ACWERN) at the University of New Brunswick (UNB). This year **Chardine** made a major resighting effort on banded birds at the main colony in the Maritime Provinces (Machias Seal Island), with the goal of determining survival rates and patterns of recruitment. **Chardine** also reports that Prince Edward Island should be "tern heaven" with its many sand bars and spits, which provide potentially ideal habitat for breeding terns. However, Common Tern (*Sterna hirundo*) populations have been declining, as has the number of viable colonies. This year **Chardine** put together a Prince Edward Island tern warden program, and, in collaboration with **Kevin Teather** (University of Prince Edward Island), hired **Nic McClelland** to monitor tern breeding activity at several colonies. Preliminary findings suggest that predation from various sources appears to be a limiting factor at most sites. This year only one main tern colony was successful on the island. **Chardine** has also started a multi-year program to answer why Red-necked Phalaropes (*Phalaropus lobatus*) have disappeared

from the outer Bay of Fundy. He will begin by examining food availability using surface zooplankton tows in the Deer/Campobello Island area of New Brunswick, repeating work that was originally done in the early 1980s. At that time, 100,000s to a million south-bound phalaropes used the area to feed mainly on the copepod *Callanus finmarchicus*.

MSc student **Mathieu (Matt) Charette**, in collaboration with **Andrew Boyne** and **Tony Diamond** (ACWERN), will be comparing populations of Common and Arctic (*Sterna paradisaea*) Terns on two similar near-shore islands, Machias Seal Island (New Brunswick) and Country Island (Nova Scotia). Both small islands have low rates of predation (no mammalian predation) although there is some avian predation by Great Black-backed Gulls (*Larus marinus*). Both islands have mixed colonies of the two tern species, and both islands have human presence and researcher disturbance. The goal is to understand why the Arctic Tern colony on Machias Seal Island, one of the largest in the Atlantic region, is not increasing. In the last few years the Common Tern colony there has increased, but the Arctic Tern colony has remained constant or perhaps even declined, with productivity much lower than on Country Island. **Charette** will be comparing data collected from both islands since 1996 (productivity, growth, and feeding studies), and will be looking at parental condition, productivity, growth, feeding, habitat, weather and predation.

Jean-François Rail, **Gilles Chapdelaine**, and **Jean-François Cloutier** (all CWS, Québec) accomplished a nearly complete census of seabirds on the Gaspé Peninsula this summer. **Serge Brodeur** (Parks Canada) assisted around Forillon National Park. Of the 13 seabird species found breeding, the most abundant were the Northern Gannet (*Morus bassanus*), Common Murre and Black-legged Kittiwake. Population trends were estimated using results from the last census (done in 1989). Numbers of Razorbills and Great Cormorants (*Phalacrocorax carbo*) had

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increased considerably since 1989, and several new colonies were discovered. Common Murres was also found breeding at new sites. However, at Bonaventure Island, where more than 8% of murres were found, the colony appeared either stable or slightly smaller compared to 1989. Suitable nesting habitat may be a limiting factor on Bonaventure Island; the island supports over 75,000 pairs of cliff-nesting seabirds. Northern Gannets occupy every suitable ledge and continue to invade further onto the plateau of the island. The gannet colony may now have exceeded 40,000 pairs (36,936 pairs were counted in 1999). The Gaspé Peninsula supports one of the largest concentrations of Black Guillemots (*Cephus grylle*) in the Northwest Atlantic, with more than 5,000 pairs, and the species appears to be doing well. However, the census method (adult counts converted to number of breeding pairs, using k-ratios calculated in 1979) needs to be revisited and its accuracy verified. Herring Gulls (*Larus argentatus*) and Black-legged Kittiwakes declined substantially (–34% and –45%, respectively) between 1989 and 2002. Common Terns also declined sharply, and only two active colonies were found. These species' future is threatened around the Gaspé Peninsula because of the limited number of potential breeding sites, and because of increasing interactions with gulls, mammalian predators and humans.

André Breton is in his third year of work on his PhD thesis, "Demographic Parameter Estimates and their Biological Implications for a Seabird Metapopulation". The research, which he anticipates will take 4 years, is being done at ACWERN (UNB). His advisory team includes Tony Diamond (ACWERN), Steven Kress (National Audubon Society) and Richard Elliot (CWS). Data are from five separate colonies in the Gulf of Maine, spanning 21 consecutive years of marking and resighting (1982-1902). The focal animal is the Atlantic Puffin (*Fratercula arctica*). The demographic parameters he is investigating include age-specific sur-

vival rates and movement rates in two forms: estimates of within-summer movement probabilities for subadult cohorts, and emigration and natal recruitment rates. Breton is using within-summer movement probabilities to predict breeding status (breeding or not; birds show 100% colony fidelity once they have bred one time). Without that "signal," it is impossible, or at least exceptionally difficult, to identify emigration and natal recruitment rates. Breton's work addresses both temporal and spatial scale issues, providing year-by-year (and longer) measures of survival and movement. Colony-specific analyses will be extended to an entire metapopulation.

Alexis Blackmer of the University of California at Davis (UCD), in collaboration with Josh Ackerman (UCD), Charles Huntington (Bowdoin College), Robert Mauck (Kenyon College), Gabrielle Nevitt (UCD), and Joseph Williams (Ohio State University), are researching Leach's Storm-petrels (*Oceanodroma leucorhoa*) at the Bowdoin Scientific Station at Kent Island, New Brunswick. The influence of investigator disturbance on reproductive success is being studied (Blackmer, Ackerman, and Nevitt). The mate familiarity hypothesis (the link between pair bond duration, behavioral coordination, and reproductive success) of Leach's Storm-petrels is being tested (Blackmer, Huntington, Ackerman, and Nevitt), and basal metabolic rates are also being examined (Blackmer, Mauck, Huntington, Ackerman, Williams, and Nevitt).

ARCTIC CANADA

Keith Hobson (CWS, Saskatchewan) continues to explore applications of stable isotopes (primarily ^{13}C and ^{15}N) to questions involving trophic ecology of seabirds and contaminant flow in marine ecosystems. His current work involves analysis of isotopic profiles of seabirds from the Northwater Polynya, and the long-term monitoring of diet in Thick-billed Murres (*Uria lomvia*), Black-legged Kittiwakes (*Rissa tridactyla*) and Northern Fulmars

(*Fulmaris glacialis*) at Prince Leopold Island in the Canadian Arctic. Other work includes dietary analyses of Common Eiders (*Somateria mollissima*) wintering on the Belcher Islands, Nunavut, and the application of isotopes as fingerprints to delineate population of eiders in the eastern and western Arctic. International collaborations include work on seabird communities off Patagonia, Argentina, the Mediterranean, the Southern Ocean, and Antarctica.

Mark Mallory (CWS, Nunavut) writes that work continued on Common Eiders nesting in Frobisher Bay. Intensive boat surveys were conducted of 100 nearby islands. During the surveys Black Guillemots were also monitored; guillemots are numerous in the bay and co-locate on islands with eiders. The Frobisher Bay work was preceded by a survey of indigenous knowledge of local hunters and elders on the population trends and nesting patterns of local eiders. The data will be merged with those collected by Grant Gilchrist (CWS, Hull, Québec) and crew along southern Baffin Island to describe eider nesting locations and habitat types around the Meta Incognita Peninsula. In the Belcher Islands, Gilchrist and crew conducted studies on over-wintering eiders, including use of underwater cameras lowered through the ice to examine foraging behavior of birds feeding at polynyas. At East Bay, Southampton Island, Gilchrist and Myra Robertson (CWS, Yellowknife, Northwest Territories) continued their studies on Common Eiders, including projects examining movements (by satellite telemetry), reproductive behavior, incubation, physiology, and interactions with predators.

Concurrent with these studies were research projects on Herring Gulls and shorebirds. Aerial surveys for distributions of marine birds were also conducted by Alain Fontaine, Kathy Dickson, Steve Wendt, Dale Caswell (all CWS) and Paul Castelli of the United States Fish and Wildlife Service (USFWS) around Foxe Basin and nearby islands. Data from these surveys are currently being summarized. Mallory and

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Fontaine completed the final draft of a CWS Occasional Paper, "Key Marine Habitat Sites for Migratory Birds in Northwest Territories and Nunavut." The paper summarizes much of the published and gray literature and also uses unpublished data to synthesize what is known about marine sites for birds in the Arctic. Mallory and Gilchrist surveyed known nesting colonies of Ivory Gulls (*Pagophila eburnea*) in the High Arctic. The species is uncommon, and this was the first survey of more than 90% of known nesting sites in over 15 years. The aerial surveys were matched by a ship-based survey in August by Fontaine. Ivory Gulls appear to have declined since the last population studies. During this year's surveys, information on a variety of other marine birds was collected, including new colony locations for Glaucous Gull (*Larus hyperborea*), Arctic Tern, and Sabine's Gull (*Xema sabini*). Gilchrist also continued as one of the principal participants in seabird research at Prince Leopold Island, focusing on Thick-billed Murres, Northern Fulmars and Black-legged Kittiwakes. Mallory also assisted Tony Gaston (CWS, Hull, Québec) with ongoing studies of Thick-billed Murres at Coats Island. Data from these studies are currently being analyzed.

OREGON AND WASHINGTON

Summarized by Jan Hodder

MARbled MURRELETS

The Marbled Murrelet Effectiveness Monitoring Program (MMEMP) continued the development and implementation of long-term monitoring programs in both marine and inland forest ecosystems. The Population Monitoring Team, comprised of Martin Raphael of the United States Forest Service, Pacific Northwest Research Station (PNW-USFS), Chris Thompson of the Washington Department of Fish and Wildlife (WDFW), Craig Strong (Crescent Coastal Research), CJ Ralph, and Jim

Baldwin (PSW-USFS), conducted another year of marine surveys throughout 5 of the 6 conservation zones for the Marbled Murrelet (*Brachyramphus marmoratus*). They now have three years of murrelet population data and plan to conduct surveys again during the 2003 breeding season. Analysis of survey data from 2000 and 2001 resulted in a murrelet population estimate for each year of approximately 20,000 birds for the 5-zone area.

The Habitat Monitoring Team, comprised of Diane Evans Mack (PNW-USFS), Kim Nelson of the Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University (OCFWRU-OSU), Sherri Miller, Jim Baldwin, and Tim Max (both of PNW-USFS), continued to collect data from inland forest sites that will be used to model murrelet habitat relationships across the 5 conservation zones. This ground-based vegetation sampling was conducted at the tree- and stand-scale in "occupied" and "absence" sites, as identified from previous PSG Inland Survey Protocol surveys across multiple land ownership in western Washington, Oregon and California. This year the team will begin to focus on developing a baseline map of murrelet habitat. The map will be derived from a region-wide vegetation map that is being prepared by the US Forest Service and Bureau of Land Management. The current team leader, Patrick Jodice, will be vacating the position in October 2002. He will become the Assistant Unit Leader of the USGS South Carolina Cooperative Fish and Wildlife Research Unit at Clemson University. A replacement team leader has not been named as of this writing. Updates, annual reports, and news about the Effectiveness Monitoring Program can be found at www.reo.gov/monitoring.

Kim Nelson continued her research with the MMEMP for the Northwest Forest Plan, as outlined above. She also began developing models of murrelet habitat associations, using satellite maps from both the Interagency Vegetation Mapping Project and the Coastal Land-

scape Assessment and Modeling Study, plus the nest-site characteristics collected in Oregon and Washington using intensive tree climbing (in cooperation with Tom Hamer, Doug Meekins and Mandy Wilson). Kim also continued to work on updating and modifying Oregon's Marbled Murrelet survey database for use in the MMEMP, and as part of an effort by Oregon Department of Fish and Wildlife (ODFW) and US Fish and Wildlife Service (USFWS) to archive information on murrelet surveys and habitat use.

In other research, Kim concluded her studies of the Long-billed Murrelet (*Brachyramphus perdix*) in Japan. Her paper, along with others presented at the PSG Japanese Seabird Symposium in 2001, was published in the Journal of the Yamashina Institute of Ornithology. In cooperation with the Oregon Parks and Recreation Department, she continued to conduct dawn surveys in Oregon's state parks as part of an effort to determine murrelet occupancy along the coast. All the OSU projects were completed with the assistance of Mandy Wilson, Karen Cradler, Ross Hubbard, Jim Rogers, Scott Kirby, Jessi Lyons, Kyle Legare, Anni Ala, Veronica Armejós and Dawn Loomis.

Martin Raphael, Diane Evans Mack, and Randall Wilk, of PNW-USFS in Olympia, Washington, continued several collaborative studies on Marbled Murrelets in Puget Sound and Hood Canal during 2002. As part of the MMEMP, they completed the third year of long-term population monitoring of Marbled Murrelets under the Northwest Forest Plan. They surveyed Recovery Zone 1, including the San Juan Islands to Olympia in Puget Sound and the Strait of Juan de Fuca. They also continued to collect baseline data on within-season and annual changes in distribution, density, and productivity indices of murrelets in the San Juan Island archipelago and Hood Canal. As part of the MMEMP, work continued to develop a map of potential murrelet nesting habitat for the Olympic Peninsula, Western Washington

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Cascades, and Western Washington lowlands. Other cooperators in this work included the Washington Department of Natural Resources, National Park Service, Rayonier Timber Lands, and WDFW.

In collaboration with **Brian Cooper** of ABR, Inc, the PNW-USFS conducted a fifth year of radar sampling in 10 large drainages around the Olympic Peninsula, in order to correlate murrelet numbers with the distribution and landscape configuration of nesting habitat defined at a broad scale. Efforts this year will focus on integrating murrelet abundance from radar with models being developed by **John Marzluff**, University of Washington, that relate predicted murrelet nesting probability and risk of predation to habitat features at the stand and landscape scales.

Turnstone EC Inc. survey crews conducted 1250 surveys for Marbled Murrelets on state lands including Oregon Department of Forestry districts in western Oregon, and 886 surveys on state lands in western Washington, both along the base of the Olympic peninsula and in the Capitol State Forest south of Olympia. They were also involved in a nest search project on the Elliott State Forest in western Oregon. Crews conducted general surveys in randomly selected survey cells; they homed in on cells with murrelet activity to conduct site- or even tree-specific surveys in an effort to locate nests. For further information contact **Tom Williamson** (tom@turnstoneenvironmental.com).

The National Park Service completed the second year of Marbled Murrelet surveys at San Juan Island National Historical Park, using the PSG Island Survey Protocol. All suitable habitat stands within the park were surveyed. In over two years of surveying at four areas, only one audio detection was documented. For further information contact **Shelley Hall** (Shelley_Hall@nps.gov).

Kimberly Augenfeld (ABR, Inc.) surveyed for Marbled Murrelets with both audio-visual surveys and radar at sites on the Oregon coast, in Northern

California, the Olympic Peninsula, and the Washington Cascades.

CASPIAN TERNS

Research on predation by seabirds on juvenile salmon in the lower Columbia River was continued by a team from Oregon State University (OSU), Columbia River Inter-Tribal Fish Commission, and Real Time Research. This year's research team included **Dan Roby**, **Ken Collis**, **Don Lyons**, **Anne-Mary Myers**, **Rob Suryan**, **Bobby Begay**, **Cindy Anderson**, **Scott Anderson**, **Michelle Antolos**, **Sadie Wright**, **Mike Hawbecker**, and a number of seasonal technicians and volunteers. Seabirds investigated include Caspian Terns, Double-crested Cormorants, Western and Glaucous-winged Gulls (*Larus occidentalis* and *L. glaucescens*), and White Pelicans (*Pelecanus erythrorhynchos*). All nesting by Caspian Terns in the Columbia River estuary (ca. 9,900 pairs) occurred on East Sand Island in 2002. Roughly 11,000 fledglings were produced at the East Sand Island colony in 2002, corresponding to a nesting success of 1.1 young raised per breeding pair. One of the main research objectives was to monitor management of the East Sand Island colony by the interagency Caspian Tern Working Group. This work resumed after settlement on 2 April 2002 of a lawsuit brought by conservationists against several agencies. Terns were encouraged to nest on East Sand Island by habitat restoration, tern decoys, and audio playback; flagging was placed on the remaining unvegetated sand habitat at the former Rice Island tern colony; and hazing was permitted where terns were prospecting for a new colony site (before any eggs were laid). A longer report on this study by Roby et al. is elsewhere in this issue.

Michelle Antolos (OSU) is finishing her thesis on breeding and foraging ecology of Caspian terns in the mid-Columbia river. She is analyzing predation on juvenile salmonids and the management implications of this. **Rob Suryan** (OSU) continues to work with **Dan Roby** on a variety of projects, including the

Columbia River Avian Predation study (see Roby's update for details), satellite telemetry of Short-tailed Albatrosses (*Phoebastria albatrus*), and unending analyses of data from the APEX study in Prince William Sound, Alaska (see the Alaska report for the latter two studies). (Yes, Rob is a student again...but trying not to break **George Divoky's** record!)

On August 30, 2002, USFWS released the "Status Assessment and Conservation Recommendations for the Caspian Tern (*Sterna caspia*) in North America," authored by **Dave Shuford** (Point Reyes Bird Observatory, PRBO) and **David Craig** (Willamette University). **Tara Zimmerman** and **Nanette Seto** (USFWS) coordinated the completion and release of this document and should be contacted for copies of it. This document is one of three technical reports that USFWS and other partners are preparing associated with Caspian Tern management issues in the Columbia River estuary. The second report, which analyzes avian predation to assess the significance and effect of Caspian Tern predation on salmon recovery in the Columbia River estuary, was prepared by the National Marine Fisheries Service and is available on their website: (www.nwr.noaa.gov/1habcon/habweb/ternfinalprint_09-26-2002.pdf). The third report, a feasibility analysis assessing the status and conditions of historic, current, or potential nesting sites of Caspian Terns in the region, is currently being developed by the U.S. Fish and Wildlife Service. Beginning in June, site visits were conducted by **Nanette Seto**, **Jeff Dillon** (USFWS), and **Dave Shuford** in California, Oregon, Washington, Idaho, and Nevada. These sites were reviewed for their potential for supporting large colonies of nesting Caspian Terns, specifically assessing habitat management needs and available prey resources. A final report will be completed in February 2003. (Also see "Conservation News" in this issue.)

MONITORING

In June, **David Pitkin**, **Roy Lowe** and **Ramiel Papish** (USFWS, Oregon

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Coast National Wildlife Refuge Complex) conducted their annual coast-wide aerial photo survey of seabird colonies. The survey covered all colonies of Common Murre (*Uria aalge*) and Brandt's Cormorant (*Phalacrocorax penicillatus*) along the Oregon Coast, and the majority of Double-crested Cormorant (*Phalacrocorax auritus*) colonies there. Although weak to moderate El Niño conditions have been present in the tropical Pacific this year, sea surface temperatures along the Oregon coast were normal or below normal throughout the seabird breeding season for the fourth straight year; upwelling was average or above average, especially south of Cape Blanco. Schools of baitfish were abundant this year in the nearshore zone, and ocean productivity generally appeared to be high along the entire coast. Murre attendance at south-coast colonies appeared strong, but murre attendance and productivity at a number of north-coast colonies has been reduced over the last several years because of increasing harassment by Bald Eagles (*Haliaeetus leucocephalus*) during the breeding season, a pattern which held true in 2002. On Colony Rock at Yaquina Head, murre densities in 2002 appeared to be the highest ever witnessed in Oregon. The extreme density on Colony Rock has resulted from Bald Eagles forcing over 20,000 murres to completely abandon Gull Rock, approximately 8.5 km north of Colony Rock. These displaced breeders have tried to breed on Colony Rock for the last several years.

The annual survey of Pelagic Cormorant (*Phalacrocorax pelagicus*) nesting attempts at 17 colonies near Newport, Oregon continued for the 14th consecutive year. Anson Koehler, Ramiel Papish and David Pitkin conducted boat and land-based surveys along 16 miles of coastline between Newport and Depoe Bay. Pelagic Cormorant nests at these colonies numbered approximately 10% below the 15-year mean. Jan Hodder and students in her summer marine birds and mammals class at the University of Oregon's Institute of Marine Biology monitored Pelagic Cormorant nesting

sites south of Coos Bay and reported nesting success close to the 30-year mean.

In September, David Pitkin and Ray Bentley (USFWS) conducted the annual coast-wide aerial survey of California Brown Pelicans (*Pelecanus occidentalis*) from the mouth of the Smith River, northern California, to the Columbia River. In Astoria they picked up Marie Fernandez (USFWS) and continued surveying pelicans from the Columbia River to Point Grenville, Washington. Ulrich Wilson (USFWS) conducted a boat-based survey of California Brown Pelicans from Point Grenville north along the Washington coast.

Todd Hass is continuing with his efforts to coordinate the Coastal Observation and Seabird Survey Team (COASST) program. Over the past year, COASST has expanded to include over 60 beaches throughout Washington and northern Oregon. More than 220 volunteers contributed data from over 745 surveys, and walked almost 2000km of beach (plus the distance of their return walks!). Overall, they found 717 birds of 53 species. Other developments in 2002 included: a re-vamped website that allows real-time data entry and validation (www.coasst.org), and a 70-page update/supplement to *Beached Birds: A COASST Field Guide*. For more information or a copy of COASST Reports 01-02, please contact Program Coordinator, Todd Hass, at (206) 221-6893 or thass@u.washington.edu.

David Nysewander, Joe Evenson, Bryan Murphie, and Tom Cyra continued several monitoring studies associated with the marine bird component of the Puget Sound Ambient Monitoring Program (PSAMP), which focuses on the inner marine waters of Washington State. Budget cuts late in the year forced the project to curtail some aspects, such as marine mammal work and great blue heron surveys. However, they were able to continue their two major emphases, winter aerial surveys to monitor the winter densities of marine birds, and monitoring of the breeding numbers of Pigeon Guillemots (*Cephus columba*).

The winter aerial surveys of marine birds and waterfowl that started in 1992 were conducted again during December 2001 and January 2002. Maps of densities for selected species and other data products are available for the winters of 1992-2002 and for summer surveys of 1992-1999. These are mainly available through the Wildlife Resources Data Section of Washington Department of Fish and Wildlife in Olympia through Shelly Snyder at (360) 902-2483. Concern continues about the decline of many marine bird species monitored in this region over the last 20 years. The largest declines have been in fish-eating species like Western Grebes (*Aechmophorus occidentalis*) that prey upon forage fish, and in species like scaup and scoters (*Aythya* spp. and *Melanitta* spp.), which feed on forage fish eggs at crucial times in the spring; availability of this roe has been declining. Washington Department of Fish and Wildlife staff also are conducting fall shorebird surveys in the bays of north Puget Sound.

Washington Department of Fish and Wildlife's PSAMP program, USFWS, and volunteer groups have also completed the fourth year of boat-based surveys of Pigeon Guillemots at breeding sites throughout all of the inner marine waters of the state during May 2002. These surveys follow a standardized census protocol; the collaborative effort probably will last five years. It is now clearly documented that close to 16,000 Pigeon Guillemot breed in the inner marine waters of Washington. Contact Joe Evenson at (360) 902-8137 for further information on this effort.

The Olympic Coast National Marine Sanctuary (OCNMS) continued its long term monitoring of seabirds. The sixth at-sea seabird survey was conducted in June 2002 from the NOAA Ship *McArthur*. The surveys were part of a larger research effort, "Sanctuary Quest," a multi-disciplinary research initiative throughout the west coast National Marine Sanctuaries. Within OCNMS, observers Barbara Blackie and Scott Mills collected strip-transect data on 10 of the 14 established track lines within the

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anctuary. **Steve Intelmann** conducted pilot project of hydroacoustic surveys multaneously on some of the transects, while CTD casts were conducted on subsequent passes of the same lines. In September, Scott Mills collected opportunistic scan samples from the RV *McArthur* when it returned to Washington waters for a mapping project, providing insight into seasonal usage of OCNMS by seabirds. Biologists with OCNMS are currently re-examining their monitoring methodology and will convene a workshop this December with fellow at-sea researchers in order to develop a cohesive long term monitoring plan for seabirds and marine mammals. The goal is to make the protocol be more comparable with other studies that have similar research questions and issues. OCNMS and the Olympic Park Institute also co-sponsored a successful shipboard seabird ecology class taught by **Bob Boekelheide**.

The Menzies Project has been conducting cruises for the public around Protection Island twice weekly. They record birds sighted during the cruises around the island and in the Strait of Juan de Fuca. They are interested in recommendations from others on how to generate more useful data on their trips; they would welcome the opportunity to share data and to discuss opportunities for collaboration. Contact **Judy D'Amore** at jdamore@macaid.com.

OTHER RESEARCH AND MANAGEMENT

Julia Parrish, University of Washington and **Chris Thompson**, Washington Department of Fish and Wildlife, and graduate students **Christina Maranto**, **Joanna Smith**, and **Francis Weise** have begun studies on seabirds in the middle section of the Columbia River. They will be based in Wenatchee, Washington.

Stephani Zador recently completed her second field season assessing Common Murre reproductive efforts at Point Grenville, Washington. As part of her PhD dissertation research on the population dynamics of murre in Washington and Oregon, this information will be

used to design a suitable restoration plan for this colony. **Colin French**, University of Washington, is continuing on-going studies of Common Murre breeding biology at Yaquina Head, Oregon, and Tatoosh Island, Washington.

Nathalie Hamel's MS thesis project at the University of Washington is an assessment of the risk of bycatch of Common Murres in the gillnet fisheries of both Washington and British Columbia. She is developing an index of bycatch risk based on the spatiotemporal distribution of the murre and the timing and intensity of the fisheries. **Lora Leschner** and **Nathalie** worked together to develop the Washington Seabird Monitoring Database, which will be used in the USFWS Seabird Conservation Plan. The database contains all seabird (on-colony) projects since 1980, as well as all reports and publications related to those projects.

Christina J. Maranto completed her MS degree at the University of California, Irvine in the laboratory of Dr. George L. Hunt, Jr. Her thesis is entitled, "The Influence of Prey Choice and Food Quality on Reproductive Performance in an Arctic Tern Population." She is entering the Ph.D. program in Zoology at the University of Washington under the supervision of **Julia Parrish**, where her research will focus on the foraging ecology of seabirds in the mid-Columbia River.

The United States Fish and Wildlife Service (USFWS) is developing a seabird conservation plan for the agency's Region 1, which covers the Pacific Coast outside Alaska. Included in this region are the temperate and subtropical species of the California Current System (Washington, Oregon, California), and the tropical seabirds of Hawaii and the U.S. Pacific Islands. The plan will review seabird resources and habitat, discuss issues and threats, summarize current monitoring and management, and identify priorities to direct USFWS conservation activities in the future. **Maura Naughton** is the USFWS lead on this project; she is working with numerous partners in drafting the plan, including biologists from

Point Reyes Bird Observatory (PRBO), United States Geological Survey (USGS), University of California, Davis, Marine Endeavors, and others.

Preparation of the Oregon Seabird Colony Catalog continues, with the hope that printed, electronic and on-line versions will be developed more or less simultaneously. **Khemarith So** (Americorps), **Craig Strong** (Crescent Coastal Research), **Maura Naughton**, **David Pitkin**, and **Roy Lowe** (USFWS) and **Jan Hodder** have been working on the project.

Kim Dietrich's MS thesis research is focused on seabird bycatch rates in Alaska longline fisheries. **Suzann Speckman** is continuing her PhD work on how forage fish influence seabird ecology in Cook Inlet, Alaska. Details are in the regional report for Alaska.

NORTHERN CALIFORNIA

Summarized by **Meredith L. Elliott**

MURRELETS

Richard Golightly of Humboldt State University (HSU), **Percy Hébert** (HSU), and **Dennis Orthmeyer** of the US Geological Survey, Western Ecological Research Center (USGS-WERC) completed their second year of a study to determine the effects of noise and human disturbance to nesting Marbled Murrelets (*Brachyramphus marmoratus*) in Redwood National and State Parks. **Brian Acord** (HSU) is researching habitat use and temporal differences between breeding and non-breeding Marbled Murrelets for his Master's thesis. The study will also provide information about at-sea distribution, movement patterns, nesting behavior, and nest-site characteristics. Cooperators on this project include **Howard Sakai** (Redwood National Park), Bureau of Land Management (BLM), US Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), and California Department of Parks and Recreation.

Ben Becker received his PhD from the University of California, Berkeley

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(UCB) in December 2001 and is now director of Pacific Coast Science and Learning Center at Point Reyes National Seashore (PRNS). He is continuing his diet studies of Marbled Murrelets in central California using stable isotopes with **Steve Beissinger** and **Zach Peery** (both of UCB). He now has trophic level data for 1997-2002 and is currently seeking funds to establish nearshore seabird monitoring around PRNS in collaboration with the National Oceanic and Atmospheric Administration (NOAA).

David Suddjian (David Suddjian Biological Consulting Services), in collaboration with **Esther Burkett** (CDFG), has been continuing a long-term monitoring program of Marbled Murrelets in Big Basin Redwoods State Park and Portola Redwoods State Park. Murrelet activity was the lowest ever at Big Basin, continuing a documented long-term decline at what was formerly the murrelet's highest-activity site in the Santa Cruz Mountains. David has also been researching Marbled Murrelet nesting habitats in Big Basin Redwoods, Portola Redwoods, and Butano State Parks, San Mateo Memorial County Park, and lands of Big Creek Lumber Company. The focus of this study is to compare populations of corvids (Common Raven [*Corvus corax*] and Steller's Jay [*Cyanocitta stelleri*]) in murrelet nesting habitats in campgrounds and away from campgrounds.

David Bigger (Sustainable Ecosystems Institute), **Sal Chinnici** (The Pacific Lumber Company), and **Steven Courtney** (Sustainable Ecosystems Institute) are conducting research on inland habitat use patterns of Marbled Murrelets in Humboldt County. This is the most intensive inland monitoring program for Marbled Murrelets in North America, with 244 audio-visual surveys and 94 radar surveys each year. Results have indicated that radar is more efficient than audio-visual methods in detecting trends in murrelet activity. Furthermore, the density of Marbled Murrelet detections in old growth redwoods is greater over large blocks of un-entered (uncut) stands than in partially cut stands. Over the past

three years, the number of murrelet inland detections (audio-visual and radar) has increased. USFWS, CDFG, BLM, California State Parks, and ABR, Inc. (formerly Alaska Biological Research, Inc.) are collaborators on this project.

Douglas Meekins (The Campbell Group) has completed his second year of an ongoing study of the presence and distribution of Marbled Murrelets in various watersheds on lands owned by Hawthorne Timber in Mendocino County. Meekins is examining murrelet use at the landscape scale. Surveys are being done with both radar and standard ground protocol. The goal is to determine the potential use of small, isolated old-growth stands or small clumps of residual old-growth trees by nesting murrelets. Preliminary results from radar suggest that murrelets occur in higher densities in watersheds on the Hawthorne Timber lands than previously expected. However, at the stand scale, radar and ground surveys have failed to detect marbled murrelets using old growth stands or residual clumps in these lands or adjacent to them.

C. John Ralph and **Sherri Miller** (Bird Monitoring Laboratory of the Redwood Science Laboratory, USDA Forest Service) continued their monitoring of Marbled Murrelets off the coast of Northern California, Oregon and Washington. **Gary Falxa** and other personnel at the USFWS office in Arcata provided assistance on the surveys.

FARALLON ISLANDS

William Sydeman, **Russell Bradley**, **Adam Brown**, **Natalia Collier**, **Jerry Nusbaum**, **Peter Pyle**, and **Pete Warzybok**, all of the Point Reyes Bird Observatory (PRBO), in collaboration with **Joelle Buffa** (Refuge Manager of the San Francisco Bay National Wildlife Refuge Complex [SFBNWRRC]) monitored 12 species of seabirds and 5 species of pinnipeds on the Farallon Islands National Wildlife Refuge for the 33rd season. The effects of climate change and variability on the population dynamics, demography and feeding ecology of these species is being researched. Initial

results indicate an above-average year for seabird productivity for all species except Western Gull (*Larus occidentalis*). Cassin's Auklets (*Ptychoramphus aleuticus*) bred unusually early this year, and they had a productive season, with a high rate of double-brooding. The banding program yielded interesting discoveries among Ashy Storm-Petrels (*Oceanodroma homochroa*): one bird that was banded at Prince Island (Channel Islands) in 2001, indicating intercolony movement, and another that had been banded as an adult in 1973, making it more than 30 years old.

Two one-day cruises were conducted in the Gulf of the Farallones National Marine Sanctuary in April 2002 aboard the research vessel *John H. Martin*. Seabird, marine mammal and euphausiid swarm surveys were conducted to determine zooplankton species and distribution during this unusual season for Cassin's Auklets. This was a collaborative effort between PRBO (**David Hyrenbach**, **Lucy Vlietstra**, **Sydeman**, **Sue Abbott**, **Meredith Elliott**, and **Jason Yakich**), NOAA/Gulf of the Farallones and Cordell Bank National Marine Sanctuaries (**Dan Howard**, **Dale Roberts**, and **Jan Roletto**), and the National Park Service (**Ben Becker**).

Bart McDermott (SFBNWRRC), in collaboration with **Bradley Brown**, **Kyra Mills**, **Pyle**, and **Warzybok** (PRBO), continued their study on the seasonal population trends of the introduced house mouse (*Mus musculus*) on Southeast Farallon Island (SEFI). This species may have negative impacts on Cassin's Auklets and Ashy Storm Petrels by attracting migratory owls, such as Burrowing Owls (*Athene cunicularia*) and Barn Owls (*Tyto alba*). Trapping surveys initiated in March 2001 indicate that the house mouse population peaks between October and November and declines sharply from February to June. When the mouse population crashes in spring and summer, it is thought that the owls turn to Cassin's Auklets and Ashy Storm Petrels as a food source. Mouse population dynamics are also being assessed (i.e. vegetation cover, mouse diet,

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and relationships to predators and seabirds). Owl pellets were collected and analyzed, and the results showed an increase in the occurrence of bird remains (Cassin's Auklets, Ashy Storm Petrels, and migrant passerines) between April and July.

Nadav Nur and Sydemann (PRBO) recently finished a statistical analysis of techniques to estimate Common Murre (*Uria aalge*) breeding populations based on the long-term database from the Farallon Islands, supported by the Apex Houston Trustee Council.

Derek Lee, Sydemann, David Gardner, Aileen Miller and Nadav Nur (PRBO) recently began an in-depth analysis of survival rates of many Farallon seabirds, including Common Murre, Cassin's Auklet, Rhinoceros Auklet (*Cerorhinca monocerata*), Western Gull, and Ashy Storm-Petrel. Survival analyses will be incorporated into models of population viability and presented in the California Current Marine Bird Adaptive Conservation Plan (see below).

NORTHERN AND CENTRAL CALIFORNIA COAST

The San Mateo County Mystery Spill that has been affecting seabirds off the central California coast since November 2001 was identified as oil leaking from the sunken SS *Jacob Luckenbach*. The *Luckenbach*, a 468-foot freighter, sank in 1953 approximately 17 miles southwest of the Golden Gate Bridge. Its oil has been positively identified in other mystery spills since 1992. The source of this spill was identified by CDFG's Office of Oil Spill Prevention and Response (OSPR), under the direction of **Paul Kelly**; the US Coast Guard; and personnel of the University of California, Santa Cruz (UCSC) (see **Breck Tyler's** report below). Oiled seabirds have been collected and rehabilitated by the Oiled Wildlife Care Network under the direction of **Jonna Mazet**; veterinary care has been overseen by **Scott Newman** and **Mike Ziccardi** of the University of California, Davis. **Christine Abraham**, **Diana Humple** and **Meredith Elliott** (all

from PRBO) led the Wildlife Processing Group, which helps in intake procedures and the processing of dead oiled birds. As of 2 September 2002, 1327 birds have been collected dead and 816 live birds have been collected; 537 of the live birds have died or been euthanized in the rehabilitation process, 278 have been released, and one is still being treated. Approximately 90% of all birds collected have been Common Murres, with Common Murre fledglings being affected in recent months. In the meantime, the remaining oil on the *Luckenbach* is being salvaged by Titan Salvage. As of 13 September 2002, 51,000 gallons of oil had been removed from the *Luckenbach*, and salvaging efforts will continue until all oil is removed from the ship. The Gulf of the Farallones National Marine Sanctuary (GFNMS) is overseeing seabird and marine mammal observations aboard a barge that is stationed over the shipwreck.

Jan Roletto and Joe Mortenson, of GFNMS and the Farallones Marine Sanctuary Association (FMSA), continued the Beach Watch program, which consists of shoreline surveys for live and dead marine mammals and birds. Fifty-five sites currently are surveyed from Sonoma through San Mateo counties. GFNMS and FMSA are currently working on updating the Beach Watch database. The 2002 Beach Watch Technical Report will be distributed at the end of October; it will contain information on regional encounter rates for live and dead birds and mammals, oiled wildlife, beach deposition rates, and survey effort. The report will review data from October 1993 through September 2001 and will concentrate on 26 of the 55 beaches currently monitored.

The Common Murre Restoration Project continued for its sixth season towards the goal of restoring certain Common Murre colonies in central California using social attraction techniques. This project is conducted cooperatively by USFWS-SFBNWRC and HSU. Refuge biologist **Mike Parker**, who has led the project since its inception in 1996, departed for a new position at the refuge

as Deputy Project Leader. Veteran HSU biologists **Hugh Knechtel**, **Nathan Jones**, and **Marty Murphy**, along with newcomers **April Robinson** and **Karen Vickers**, conducted work in the 2002 field season, with oversight by **Joelle Buffa** (USFWS) and **Rick Golightly** (HSU). In mid-August, **Gerry McChesney** (USGS) was hired as the new project leader. **Karen Peluso** is leading the project's fall 2002 education program; she holds classes at local schools, where students help with painting of decoys. It was another successful season at the main restoration site, Devil's Slide Rock. The number of murre chicks fledged increased from 85 in 2001 to 95 in 2002, along with a 10% increase in breeding sites. Murres attended the other decoy site at nearby San Pedro Rock, but no breeding occurred there, probably due to disturbance by Common Ravens. The crew is hopeful that breeding will occur at San Pedro Rock in the near future, with the addition of Brandt's Cormorant (*Phalacrocorax penicillatus*) decoys and a raven management plan. Information on productivity, attendance patterns, anthropogenic and non-anthropogenic disturbances, and murre/Brandt's Cormorant interactions were collected at Devil's Slide Rock, and at other Common Murre colonies at Point Reyes Headlands, Castle Rocks, and Hurricane Point. An increase in the number of murres attending the Castle Rocks and Hurricane Point colony complex in 2002 suggested that growth in these colonies has been influenced by the closure of the Monterey Bay gillnet fishery in late 2000.

Aerial surveys of murre and cormorant colonies in northern and central California were conducted again this year in cooperation with the CDFG, as part of an ongoing effort to monitor long-term trends in breeding populations. With the implementation of a pilot outreach program developed by refuge law enforcement officer **Clyde Morris**, we hope to reduce aircraft disturbances at central California's seabird colonies. Other cooperators with the Common Murre Restoration Project include **Harry Carter**

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(HSU) and **Steve Kress** (National Audubon Society).

AT-SEA STUDIES

David Ainley and **Larry Spear** (HT Harvey & Associates), and **Cynthia Tynan** (Department of Oceanography, University of Washington), are researching seabird communities of the Northern California Current offshore of Oregon and Northern California. Several agencies are cooperating, including NOAA and the National Science Foundation. The objective is to understand mid-trophic levels through investigation of the lower and upper levels and the physical environment. This is part of the US Global Ocean Ecosystem Dynamics, Northeast Pacific Program (GLOBEC-NEP).

David Ainley (H.T. Harvey & Associates), **Carol Keiper** (Oikonos), and **Sarah Allen** (Point Reyes National Seashore) continue their long-term surveys in the Gulf of the Farallones to provide information on the response of upper-trophic marine predators to variability in ocean climate.

Breck Tyler, **Jeff Davis**, **Laird Henkel**, and **Brad Keitt** of UCSC are continuing to conduct aerial surveys of marine birds and mammals in California continental shelf waters, under contract with OSPR. The surveys are designed to collect baseline distribution and abundance data and to maintain rapid-response capabilities for oil spills in coastal waters. During the past year, the team has primarily conducted surveys from Monterey Bay to the Gulf of the Farallones as part of the *Luckenbach* oil spill response effort.

Don Croll (UCSC), together with **Baldo Marinovic** (UCSC), **Scott Benson** and **Jim Harvey** of Moss Landing Marine Laboratory are continuing surveys of seabird abundance and distribution in Monterey Bay.

David Hyrenbach continues to divide his time between PRBO and Duke Marine Laboratory. **Hyrenbach**, **Syde-man**, **Gregg Elliott**, **Kaya Pederson** and **Peggy Yen** (PRBO) and

Ken Morgan (Canadian Wildlife Service) are leading the Pelagic Predators, Prey and Processes project, an initiative to protect pelagic predators and their habitats in the California Current System. Collaborations with the National Marine Fisheries Service (NMFS) in the Gulf of the Farallones and Cordell Bank area, California Cooperative Oceanic Fisheries Investigation (CalCOFI) in southern California, and Canadian Wildlife Service and Department of Fisheries and Oceans, Canada are key to this research. Studies in each region of the CCS are designed to investigate concordance in species-habitat associations and predator-prey aggregations in relation to potential designations of marine protected areas.

Glenn Ford (RG Ford Consulting) and **David Ainley** (H.T. Harvey & Associates), in collaboration with **Carol Keiper** (Oikonos), **Sarah Allen** (NPS), **Lisa Ballance** (NMFS), and **Tracy Gill** (NOAA), are studying seabirds off the central California coast from Point Arena to Point Sal. The goal is to identify important seabird areas within and around the marine sanctuaries of central California.

OTHER STUDIES

The San Francisco Bay Bird Observatory (SFBBO), under the direction of **Cheryl Strong**, has been monitoring colonial waterbirds in South San Francisco Bay. Population size and reproductive success of California gulls (*Larus californicus*), Forster's Terns (*Sterna forsteri*), Caspian Terns (*Sterna caspia*), Black Skimmers (*Rynchops niger*), and Double-crested Cormorants (*Phalacrocorax auritus*) are evaluated. Tern and cormorant eggs have been collected for **Terry Adelsbach** (USFWS, Environmental Contaminants Division) to test for contaminants; intensive monitoring of tern nests has accompanied this study.

John Takekawa (USGS, WERC), in cooperation with **Giselle Downard** (USFWS, San Pablo Bay NWR), has conducted monitoring surveys of Western and California Gulls, Double-crested

Cormorants, Caspian and Forster's Terns, and Black Skimmers on the Napa-Sonoma Marshes (the former Cargill salt ponds). John conducted additional surveys of these species on the Alviso salt ponds of South San Francisco Bay.

Meredith Elliott and **Bill Syde-man** (PRBO) continue to study the California Least Tern (*Sterna antillarum*) colony at Alameda Point, San Francisco Bay. **Rachel Hurt** and **Chris Bandy** (USFWS, Alameda NWR) monitored the colony's reproductive success this year, while PRBO studied food habits and prey availability in the local environment. The predator-prey study has been developed in response to proposed dredging activities in the Oakland Harbor, which is adjacent to the tern colony; this work is done in cooperation with the Port of Oakland (**Andy Jahn**) and the Army Corps of Engineers (**Eric Joliffe**).

Ben Saenz and **Bill Syde-man** (PRBO) and **Jason Yakich** (San Francisco State University), in association with **Daphne Hatch** (Golden Gate National Recreational Area), continue to monitor the population dynamics of cormorants and gulls on Alcatraz Island in relation to prey availability in central San Francisco Bay. In addition to on-colony observations, studies of the dynamics of foraging flocks in San Francisco Bay continue.

Tory Poulton of the University of Wyoming worked on foraging by scaup in San Francisco Bay; see the regional report for the non-Pacific US.

Julie Thayer and **Bill Syde-man** (PRBO), with collaboration from **Gary Strachan** (California State Parks Bay Area District) demography of seabirds and provisioning rates of Rhinoceros Auklets (*Cerorhinca monocerata*) on Año Nuevo Island. **Thayer** and **Michelle Hester** (Oikonos) have started restoration project on Año Nuevo Island to restore native vegetation. Details are in the regional report for southern California and Baja California.

Kyra Mills, **Bill Syde-man** and others at PRBO are working to complete the California Current Marine Bird Adaptive Conservation Plan. This plan is being

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reated in partnership with government agencies and researchers from southern British Columbia to Baja California, Mexico, and will be coordinated with the North American Waterbird Conservation Plan. The plan will focus on promoting the health of seabird populations. It will emphasize fishery effects on the ecosystem, from the standpoint of both reductions in the biomass of prey, and changes to ecosystem functions associated with reductions in the biomass of predatory fish. Models of prey consumption will be presented. A draft is scheduled for completion in June 2003.

Maura Naughton (USFWS) is coordinating the USFWS Region One Seabird Conservation Plan, which includes all breeding seabirds in Region One (California, Oregon, Washington, Hawaii, and the U.S. Pacific Islands). The first draft has been completed.

In other conservation news, the emergency gill net closure that began on April 26 and was slated to run through August 23, 2002 will now continue until further notice. On July 29, CDFG filed a Certificate of Compliance with the Office of Administrative Law regarding the permanent regulations, which prohibit the use of gill and trammel nets in ocean waters 60 fathoms or less from Point Reyes, Marin County, to Point Arguello, Santa Barbara County. The gill net closure will help Common Murres, sea otters, and other marine life.

USGS (Western Ecological Research Center) and HSU (Department of Wildlife) continue to work in cooperation on a number of projects, with **Harry Carter** and **Rick Golightly** (HSU) and **Dennis Orthmeyer** and **John Takekawa** (USGS-WERC) as principal investigators. New research on Western Gull use of Castaic Lake area in relation to water quality issues began in 2002, with **Rich Young**, **Derek Lee**, and **Bill McIver**. **Phil Capitolo** and **Rich Young** conducted Brown Pelican (*Pelecanus occidentalis*) roost monitoring at Mugu Lagoon. Projects in the Channel Islands and Southern California Bight include aerial at-sea surveys (**Gerry McChesney**, **John Mason**, **Bill**

McIver), foraging ecology of Cassin's Auklets (**Josh Adams**), colony surveys of Brandt's and Double-crested Cormorants (**Gerry McChesney** and **Bill McIver**), and projects on Ashy Storm-Petrels and Xantus's Murrelets (*Synthliboramphus hypoleucus*). Details for the Southern California Bight and Channel Islands are in the regional report for southern California and Baja California.

Frank Gress (UC Davis and California Institute of Environmental Studies) continued studies in the Southern California Bight. He worked on Brown Pelican (*Pelecanus occidentalis*) breeding biology, and (with **Laurie Harvey** of the California Institute of Environmental Studies) on aerial photographic techniques to census breeding pelicans and cormorants. He has been monitoring cormorants and Xantus's Murrelets on Anacapa Island, and he started a two-year study on the status of the Brown Pelicans and cormorants on the Pacific Coast of Baja California, with **Eduardo Palacios** of the Centro de Investigación Científica y de Educación Superior de Ensenada and **Dan Anderson** (UCD). Details are in the regional report for southern California and Baja California.

The following projects by northern California biologists are described more fully in the regional report for southern California and Baja California: **Shaye Wolf** (UCSC), **Don Croll** (UCSC), and **Bernie Tershy** of the Island Conservation and Ecology Group (ICEG) are comparing reproductive and foraging strategies of Cassin's Auklets (*Ptychoramphus aleuticus*) in Baja California with those in the California Current. **Wolf** also completed her Master's thesis for the Ocean Sciences Department at UCSC, *The relative status and conservation of island breeding seabirds in California and Northwest México*. **Bill Henry** (UCSC), in association with **Don Croll** (UCSC) and **Bernie Tershy** (ICEG), is studying Laysan Albatrosses (*Phoebastria immutabilis*) on Guadalupe Island, Baja California. ICEG also is working on removal of rats from Anacapa Island, and in Baja California, is helping with es-

tablishment of a Mexican Natural Protected Area and on protection of seabirds that are disturbed by lighthouse maintenance and construction.

The following projects by northern California biologists are described more fully in the regional report for Hawai'i and the Pacific Rim: **Myra Finkelstein**, **Don Smith**, **Don Croll** (UCSC) and **Bernie Tershy** (ICEG) are investigating the effects of contaminant exposure on immune function in seabirds at Midway Atoll, Hawai'i. **David Ainley** (H.T. Harvey & Associates), **Keith Hobson** (Canadian Wildlife Service), **Greg Rau** (UCSC), and **Paul Augustinus** (University of Auckland), are studying Snow Petrels in East Antarctica. **Ainley** continues his work with **Grant Ballard** (PRBO), **Katie Dugger** (Oregon State University), **Peter Wilson** (Landcare Research New Zealand), and **Nadav Nur** (PRBO) on the structure and size changes of Adelie Penguin colonies on Ross Island. **Larry Spear** (H.T. Harvey & Associates), **David Ainley**, **Lisa Ballance** (NMFS), and **David Au** (NMFS), are analyzing data on seabird diets and fishery relationships that have been collected in the eastern tropical Pacific during the past 2 decades. **Mark J. Rauzon** continues to study the Tahiti petrel on Ta'u, American Samoa National Park, and he is working on a number of plans and publications for agencies in Hawai'i. Details are in the regional report for Hawai'i and the Pacific Rim.

Alexis Blackmer (UC Davis), in collaboration with **Josh Ackerman** (UC Davis), **Gabrielle Nevitt** (UC Davis), and others, are researching Leach's Storm-petrels (*Oceanodroma leucorhoa*) at the Bowdoin Scientific Station at Kent Island, New Brunswick, Canada. Details are in the regional report for Canada.

Michelle Hester (Oikonos) is currently working on her PhD on seabird ecology at the University of Cape Town, South Africa, with advisors **Les Underhill** and **John Cooper**. **Hester** also spent time in the Caribbean; details are in the regional report for the non-Pacific United States.

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Scott Shaffer (UCSC) spent a month working on Svalbard (Spitsbergen) with **Geir Gabrielsen** (Norwegian Polar Institute) on the metabolism of Glaucous Gulls (*Larus hyperboreus*) and measuring a variety of seabirds. He plans to study Sooty Shearwaters (*Puffinus griseus*) there in the future. Details are in the regional report for the Old World.

SOUTHERN CALIFORNIA AND BAJA CALIFORNIA

Summarized by **Pat Mock** and
Meredith Elliott

SOUTHERN CALIFORNIA

Frank Gress of the University of California at Davis (UCD) and the California Institute of Environmental Studies (CIES) continued his studies of Brown Pelican (*Pelecanus occidentalis*) breeding biology in the Southern California Bight, examining factors affecting reproductive success. Frank continued monitoring of Brown Pelican breeding success on Anacapa Island for the American Trader Trustee Council, and he did studies for developing aerial photographic techniques to census breeding Brown Pelicans and Double-crested Cormorants in the Southern California Bight (with **Laurie Harvey**, CIES). Other research involved the continued monitoring of Double-crested Cormorant, Brandt's, and Pelagic Cormorants (*Phalacrocorax auritus*, *P. penicillatus*, and *P. pelagicus*) on Anacapa Island. Along with Humboldt State University (HSU) and the US Geological Survey (USGS) he continued monitoring of Xantus's Murrelets (*Synthliboramphus hypoleucus*) on Anacapa Island for the American Trader Trustee Council.

Bernie Tershy of the Island Conservation and Ecology Group (ICEG) is working jointly with the Channel Islands National Park to remove black rats (*Rattus rattus*) from Anacapa Island. The second and final phase of this project is scheduled to take place Fall 2002. This project will help protect both Xantus's

Murrelets and Ashy Storm-petrels from rat predation. **Tershy** (director), **Brad Keitt**, **Kris Hulvey**, **Noah Biavaschi**, **Bill Wood**, and **Greg Howald** are working on this project.

The Western Ecological Research Center of USGS (WERC) and the Department of Wildlife at HSU continue to work in cooperation on a number of projects. **Harry Carter** and **Rick Golightly** (HSU) and **Dennis Orthmeyer** and **John Takekawa** are principal investigators. In 2002 they finished data collection and worked on the report for a 3-year study of: (a) aerial at-sea surveys for all seabird species and cormorant and pelican colonies and roosts throughout the Southern California Bight (**Gerry McChesney**, **John Mason**, **Bill McIver**); and (b) telemetry on Cassin's Auklets (*Ptychoramphus aleuticus*), focusing on foraging ecology at the Prince Island and Scorpion Rock colonies (**Josh Adams**). **Gerry McChesney** and **Bill McIver** continued colony surveys on Brandt's and Double-crested Cormorants. **Phil Capitolo** and **Rich Young** conducted Brown Pelican roost monitoring at Mugu Lagoon. **Bill McIver** did surveys of Ashy Storm-Petrels (*Oceanodroma homochroa*) at Santa Cruz Island. Xantus's Murrelet (*Synthliboramphus hypoleucus*) monitoring at Anacapa and Santa Barbara islands were done courtesy of **Darrell Whitworth**, **Harry Carter**, **Rich Young**, **Eileen Creel**, with cooperators **Hamer Environmental** (with **Tom Hamer** and **Charlie Short**), **California Institute of Environmental Studies** (**Frank Gress**), and **Channel Islands National Marine Sanctuary** (**Sarah Fangman**). New field projects in 2002 included: A new Xantus's Murrelet telemetry study was started at Anacapa and Santa Barbara Islands with **Christine Hamilton** and **Darrell Whitworth**. New research on Western Gull (*Larus occidentalis*) use of the Castaic Lake area in relation to water quality issues also began in 2002 (with **Rich Young**, **Derek Lee**, and **Bill McIver**).

For the last two years, **Pat Baird** been looking at DNA of multiple popu-

lations of Least Terns all over the United States, in collaboration with **Sue Haig** of USGS's Forest and Rangeland Ecosystem Science Center in Corvallis, Oregon. **Pat** and **Ken Jones** (Dyersburg State College, Dyersburg, Tennessee) went down a third of the Mississippi River collecting tern samples; other material came from **Ruth Beck** (College of William and Mary, Williamsburg, Virginia), **Matt Bailey** (Massachusetts Audubon Society), and people from Nebraska, Maine, Missouri, North Dakota and Florida. She will finish up the DNA study next year. **Pat** is also working with **Mark Pavelka**, US Fish and Wildlife Service (USFWS) in Carlsbad, California, to update the Predator Management Plan for California Least Terns. Graduate student **Lisa Dobson** finished her Master's thesis on using shorebirds as bioindicators to compare natural and rehabilitated wetlands in Southern California. Graduate student **Dan Robinette** is completing his thesis on competition in four species of terns.

Kathy Keane continues to monitor Least Tern nesting success in the Los Angeles Harbor. Least Tern reproductive success was very low in the harbor as well elsewhere in the state in 2002, due to very reduced prey availability near most southern California nesting sites. **Keane** is also analyzing data from a second year of Least Tern foraging surveys at 28 locations in the Los Angeles Harbor for the Army Corps of Engineers, Los Angeles District. Another study she is completing for the Corps will examine Least Tern foraging patterns in the Los Angeles Harbor over the past 20 years. **Keane** and **Charles Collins** are finalizing a comprehensive literature review for all tern species in southern California for USFWS. **Kathy** also presented an update on the status of the Least Tern population at a Western Field Ornithologist meeting in October 2002. When she can get away, **Kathy** enjoys the frigatebirds, Yellow-footed Gulls foraging in the tidepools, and gorgeous sunrises over the Sea of Cortez at her vacation home south of San Felipe, Baja California Sur.

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Charles A. Pelizza (USFWS) is documenting the population status and breeding colony sites of Gull-billed Terns (*Sterna nilotica*) in southern California and the Gulf of California. This effort is a bi-national effort with multiple investigators. The primary focus of this effort is to determine the population status and breeding sites of the species. A literature search, aerial reconnaissance, and ground observations will be used to document the status of the Gull-billed Tern in order to determine whether listing of the species as threatened or endangered is warranted.

Studies of survival and dispersal of California Brown Pelicans that are rehabilitated from Type C botulism poisoning at the Salton Sea, California are being conducted by **Pelizza**, **Dan Anderson** (UCD), **Frank Gress** (CIES) and **Paul Kelly** (California Department of Fish and Game). They will study both rehabilitated and healthy pelicans, using behavioral observations and conventional and satellite transmitters to document movements between the Salton Sea, the southern California coast, and breeding colonies in Baja California.

In addition to the two studies listed above, there are a number of research projects involved with the effects of botulism on White (*Pelecanus erythrorhynchos*) and Brown Pelicans, in particular determining the etiology of botulism at the Salton Sea. The study involves researchers from UCD; the USGS's National Wildlife Health Laboratory in Madison, Wisconsin; the California Polytechnic Institute—Ramona; and the Sonny Bono Salton Sea National Wildlife Refuge.

Pat Mock is doing a wide variety of biological consulting. His work is mostly related to conservation planning in southern California and project assessment throughout the southwestern United States. He recently completed a project near the Salton Sea Refuge that included extensive surveys of waterbird use of the area. He is doing peer review of the waterbird studies report for the proposed expansion of San Francisco International Airport. He is finishing his tenure as

Southern California Representative for PSG.

Steve Insley (Hubbs-Seaworld Research Institute) has been writing up material on razorbills. It will be published as **SJ Insley, R Paredes, and I Jones, in press**; Sex differences in razorbill (*Alca torda*) parent-offspring vocal recognition; *J Experim Biol* 206(1). Steve has also been deploying bioacoustic probes (i.e. acoustic recording tags) on northern fur seals (*Callorhinus ursinus*) on St. Paul Island, Alaska. The seal work is in collaboration with **Tom Loughlin, Bruce Robson, and Rolf Ream** of the National Marine Fisheries Service and **Bill Burgess** of Greeneridge Sciences. This study may continue into this field season.

Michelle Wainstein and Peter Hodum (California State University at Long Beach) have completed the first year of a long-term seabird research and monitoring program on the Juan Fernandez Islands in Chile. Details are in the regional report for Hawai'i and the Pacific Rim.

Judith Hand has finished her second historical novel and has written a screenplay to go with it. It's about an Amazon who fought in the Trojan War. She is also starting a bit of research on her next screenplay, to be based on *Voice of the Goddess*, her first published novel.

BAJA CALIFORNIA

Frank Gress and Eduardo Palacios of the Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE) in Baja California Sur, monitored California Brown Pelicans and cormorants on islands of northwestern Baja California (Los Coronados, Todos Santos and San Martín) in 2002. They will continue their project during 2003. **Palacios and Edgar Amador** of the Centro de Investigaciones Biológicas del Noroeste (CIBNOR) are currently monitoring seabirds breeding in the Baja California coastal wetlands. They will continue their work during 2003. **Palacios** has been coordinating a network of institutions devoted to the conservation of the California Least Tern

(*Sterna antillarum*) in four nesting sites on the Baja California peninsula (Estero de Punta Banda, Guerrero Negro, La Paz, San José del Cabo). During the 2002 breeding season, **Palacios and Amador** banded 100 Least Tern chicks in various colonies on the peninsula; the work is part of Amador's PhD thesis.

Frank Gress has started a two-year study (funded by USGS) to assess the status of the Brown Pelican and Double-crested, Brandt's and Pelagic Cormorant populations on islands along the Pacific Coast of Baja California. Collaborators on this study are **Eduardo Palacios** and **Dan Anderson** (UCD).

Bill Henry (UCSC), in association with **Don Croll** (UCSC) and **Bernie Tershy** (ICEG), are initiating a study of the breeding population of Laysan Albatross on Guadalupe Island, Baja California. **Carlos Gracia-García, José Ángel Sánchez-Pacheco, and Miguel-Angel Hermosillo** of ICEG are involved with two conservation projects in Baja California. One project is to establish a Mexican Natural Protected Area for the Pacific Islands of Baja California. We expect this reserve, which will protect several million seabirds of more than 20 species, to be created some time in 2003. The other project is working with the Mexican Secretary of Communications and Transportation, which is responsible for lighthouses, to protect seabirds and their island habitat. They have jointly developed a proposal to minimize the impacts from lighthouse maintenance and the construction of new lighthouses on the seabird islands of Baja California.

Shaye Wolf (UCSC), with **Don Croll** (UCSC) and **Bernie Tershy** (ICEG), is comparing the reproductive and foraging strategies of Cassin's Auklets breeding in the San Benito Islands, Baja California (the southernmost portion of the species' range) to those of populations breeding farther north in the California Current. **Wolf** also completed her Master's thesis for the Ocean Sciences Department at UCSC, *The relative status and conservation of island breed-*

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ing seabirds in California and Northwest México. She compares (1) seabird diversity and abundance, (2) threats to seabirds, and (3) differences in seabird management and conservation for seabirds breeding on islands in California with those that breed on islands off western Baja California.

Julie Thayer and **Bill Sydeman** (Point Reyes Bird Observatory), with collaboration from **Gary Strachan** (California State Parks Bay Area District) are studying the long-term demography of 6 species on Año Nuevo Island. As part of Julie's PhD dissertation at UCD with **Dan Anderson**, she is studying provisioning rates of Rhinoceros Auklets (*Cerorhinca monocerata*) by installing weigh-bridges in nest boxes. **Thayer** and **Michelle Hester** (Oikonos) have started a project on Año Nuevo Island to restore native vegetation. Collaborators are Año Nuevo State Reserve, Go Natives, and the University of California at Santa Cruz. The main goals of the project are to improve habitat for burrowing seabirds and other wildlife through reduction of topsoil erosion; methods include planting native shrubs and grasses. Since 1998, the rate of auklet burrow collapse has increased to >50% of occupied burrows, and immediate habitat stabilization is necessary to protect the burrowing seabird populations. Initial test plots have been installed and further work awaits funding.

HAWAII AND PACIFIC RIM

Summarized by Beth Flint

HAWAIIAN ISLANDS

Bob Day of ABR Inc. (Fairbanks, Alaska) used ornithological radar and night-vision equipment on various Hawaiian islands to look at movements of Dark-rumped Petrels (*Pterodroma phaeopygia*) and Newell's Shearwaters (*Puffinus newelli*) and to evaluate potential collision problems. He worked on the northwestern Hawaii Islands and in the Puna District of eastern Hawaii Island in June, aided by **Rich Blaha** from the Or-

egon office. **Roberta Swift** and **Carolyn Stephens** (Pacific Cooperative Studies Unit, Haleakala Field Station) helped on the Kalaupapa National Historical Park on northern Molokai Island. These surveys were the first in a century that have been done specifically for these species. **Day** then surveyed Kauai in July, in association with **Reggie David**. **Tom Telfer** (Kauai Division of Forestry and Wildlife [DOFAW], State of Hawaii) worked with **Day** and **David** on radar surveys for Newell's Shearwaters at Kaluahonu and a couple of other focal sites. He has just acquired new radar equipment for DOFAW and will try to get data for a few nights in near the fledging season, but nesting is almost over. He reports that interns are monitoring two active Newell's Shearwater burrows at Kilauea Point National Wildlife Refuge, which were established as the result of the 1978-80 cross-fostering experiment. These nests provide an opportunity for us to learn something about turnover rates of adults attending nests.

Cathleen Natividad and the biological staff at Haleakala National Park have started learning to use the Furuno Radar to track Hawaiian Petrels (*Pterodroma sandwichensis*) as they fly inland. They did a preliminary survey around east Maui in June, mostly learning to use the radar and record data. They hope to use the radar as another tool to estimate population trends. Traditional monitoring techniques of these petrels in the park indicate that there have been no major changes in population status. Recent expansion of the telescope facility at the summit of Haleakala have necessitated additional monitoring efforts for Hawaiian Petrels.

Jenness McBride and other staff at USFWS's Pacific Islands Ecological Services Division (ES-PIE) worked with Kauai Electric during 2001 to monitor and reduce the risk of seabird collisions at a new powerline. Work is continuing with the company's new owners, the Kauai Island Utility Cooperative (KIUC), to develop a Habitat Conservation Plan (HCP) that minimizes and mitigates seabird mortality associated with

KIUC's facilities and operations on Kauai. While the HCP is being developed over the next 2 years, KIUC has signed a Memorandum of Agreement with ES-PIE for interim conservation measures that will reduce seabird collisions at powerlines, and to offset powerline mortality in the long term by increasing productivity at nesting colonies. For example, KIUC has installed shields or full-cutoff fixtures on street lights in collision "hotspots", accelerated modification of power-pole street lights that still lack shielding, and will place aviation warning balls on powerlines where needed over the next 3-6 months. KIUC, in cooperation with ES-PIE, is also investigating predator control options that could be implemented at a suitable nesting colony site, by next breeding season if possible. The HCP development process will provide significant opportunities for public participation and peer review.

Monitoring of seabirds in the Hawaiian Islands National Wildlife Refuge continued in 2002. **Beth Flint** and **Cindy Rehkemper** coordinated efforts from Honolulu, and **Debra Henry** managed the program at Tern Island. As usual, much of the actual crawling around under the bushes and getting nipped by birds was accomplished by the dedicated volunteers at the field stations. Biological Technicians **Chris Eggleston** and **Alex Wegmann** are currently stationed at Tern Island to work on minimizing impacts to seabirds during upcoming construction and repair of the seawall. Biological Technicians **Tom** and **Natalie Wilkie** conducted the annual albatross survey at Laysan Island in December of 2002. **John Klavitter** has assumed the lead for biological activities at Midway Atoll National Wildlife Refuge. He and the staff at Midway maintained the multi-year project to lure Short-tailed Albatrosses (*Phoebastria albatrus*) to establish a nesting colony on Midway Atoll. They placed albatross decoys, serviced the sound system that emits albatross courting noises, and cleared vegetation. The islands' two regular Short-tailed Albatrosses arrived at the end of October

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002. Ecotoxicologists **Lee Ann Woodward** and **Elissa Reeves** (Pacific Remote Islands National Wildlife Refuge Complex) spent most of December 2002 at Midway studying the effect of contaminants on breeding performance in Laysan and Black-footed Albatrosses *Phoebastria immutabilis* and *P. nigripes*). **Ian Jones** of Memorial University, Newfoundland spent part of his sabbatical at Tern Island Station studying the demography of several species here and advising refuge staff on monitoring issues. **Paul Doherty** (formerly of USGS-BRD, and now of Colorado State University) is working on bringing all banding, re-banding, re-sighting, and recapture data for Laysan and Black-footed Albatrosses into a single database. **Allison Veit** is updating the Pacific Seabird Monitoring Database, with particular emphasis on albatross data from the Northwestern Hawaiian Island. She is supported by USFWS, Division of Migratory Birds and Habitat Programs, Portland.

Katie Swift, **Holly Freifeld**, and **Naomi Bentivoglio** (USFWS, ES-PIE) conducted surveys of seabirds, shorebirds, waterfowl, land birds, and other terrestrial biota at Kwajalein Atoll in the Marshall Islands for the United States Army for 4 weeks in September and October. **Colleen Henson** (ES-PIE) served as Chair of the North Pacific Albatross Working Group during its first year of existence. **Henson** also served on the Steering Committee for the Second International Fishers Forum on Solving the Incidental Capture of Seabirds and Sea Turtles in Longline Fisheries. **Holly Freifeld** worked on the Biological Opinion for the Short-tailed Albatross in the Hawaii Pelagic Longline Fishery and taught seabird identification to new fishery observers in that fishery. **Eric VanderWerf** has been actively collecting, collating and coordinating data on the White Tern (*Gygis alba*) population on Oahu.

John Slotterback of the Pacific Island Ecosystems Research Center, US Geological Survey, Biological Resources

Division (USGS-BRD) reports: "The *Birds of North America* account 'Band-rumped Storm-Petrel and Tristram's Storm-Petrel (*Oceanodroma castro* and *O. tristrami*),' account number 673, will soon be out. I am pleased that these species were included in the BNA...because the account provides a good summary of what we know and don't know. One of the big roadblocks to doing research on these species in Hawai'i is our inability to pinpoint colonies. I encourage people to continue to be on the lookout for exact breeding sites."

Myra Finkelstein of the University of California at Santa Cruz (UCSC), in collaboration with **Don Croll** (UCSC), **Bernie Tershy** of the Island Conservation and Ecology Group (ICEG) and **Don Smith** (UCSC) are investigating the effects of contaminant exposure on immune function in seabirds. Focus species are the Laysan Albatross (*Phoebastria immutabilis*), Black-footed Albatross (*P. nigripes*), Wedge-tailed Shearwater (*Puffinus pacificus*), and Red-tailed Tropicbird (*Phaethon rubricauda*) at Midway Atoll.

Jeremy Bisson (Department of Zoology, University of Hawaii) is beginning a study of the diets of Black-footed and Laysan Albatross (*Phoebastria nigripes* and *P. immutabilis*) salvaged from the Hawaii based pelagic longline fishery. The work is under the supervision of **Dr. David Duffy** and is supported by the US Fish and Wildlife Service (USFWS) and the University of Hawai'i Manoa. Personnel of the National Marine Fisheries Service Honolulu Longline Observer Program will play a crucial role in making this study a success.

Aaron Hebshi (University of Hawai'i) is continuing dissertation research on the effects of changes in skipjack tuna (*Katsuwonus pelamis*) abundance on Wedge-tailed Shearwater (*Puffinus pacificus*) breeding success and chick growth. He is about to begin diet studies of the birds and the tuna. In winter and spring of 2002, he traveled with Island Conservation and **Tammy Steeves** to the Revillagigedos in Mexico, where they surveyed breeding seabirds on San

Benedicto and Socorro Islands. Currently work is being done to eradicate feral mammals from Clarion and Socorro Islands to protect the endangered Townsend's Shearwater (*Puffinus auricularis*). San Benedicto Island was found to be free of mammals.

Eric Gilman (National Audubon Society, Living Oceans Program) and **Chris Boggs** (National Marine Fisheries Service, Honolulu Laboratory) conducted research on an underwater setting chute to determine its effectiveness at avoiding seabirds, and to see if the chute is practicable for use in the Hawai'i longline fishery. (A longer report by Gilman is elsewhere in this issue.)

Kathy Hopper and **Kitty Simonds** of the Western Pacific Regional Fishery Management Council, along with an international steering committee, organized and hosted the Second International Fishers Forum on Solving the Incidental Capture of Seabirds and Sea Turtles in Longline Fisheries that was held in Honolulu on November 19-22. The meeting brought together fishers, scientists, resource managers, and other interested parties from all over the world to address possible solutions to incidental bycatch of sea turtles and seabirds by longline fishing gear.

Mark J. Rauzon (Marine Endeavors, Oakland, California) has been working on many seabird conservation documents. He has submitted drafts of sections for the "Regional Seabird Plan on Hawai'i and Pacific Islands"—"Species Accounts and Seabird Habitats," "Threats from Introduced Species and Military Activities," and "Summary of Recent Research, Monitoring and Management Activities." He has completed the final draft of "A Rodent Contingency Plan for the Hawaiian and Remote Pacific Islands National Wildlife Refuges—a Rapid Rodent Response Action Plan." For the US Marine Corps Base Hawaii, he has done a report in support of Hawaiian Stilt (*Himantopus himantopus*) recovery in the Ko'olaupoko District, Oahu (a multiple-watershed view of stilt management), and an "Invasive Species Management Study."

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ELSEWHERE IN THE PACIFIC

Lindsey Hayes, Kathy Brooks, and Joe Wiggins are continuing to monitor seabird populations at Johnston and manage wildlife populations there, as the military facility is being closed and the environmental cleanup is conducted. Brown Boobies (*Sula leucogaster*) banded at Johnston continue to turn up all over the Pacific Islands, the most recent return being from Vanuatu. **Betty-Anne Schreiber** (US National Museum of Natural History) has just finished her 20th year of working on Johnston Atoll, Central Pacific Ocean, where she has been studying the breeding biology and ecology of the nesting Pelecaniformes. She also has been monitoring population sizes and nest success in all the nesting seabird species. Over the last 3 years she has been putting satellite transmitters on boobies and frigatebirds to determine at-sea feeding areas during the breeding season.

Donna O'Daniel left her position as Wildlife Biologist at Johnston Atoll after having spent 6 years in that position. She is now living in Arizona, working in the area of diet and health.

Dominique Horvath (Refuge Operations Specialist for the Pacific Remote Islands National Wildlife Refuge Complex) made a brief monitoring visit to Jarvis Island National Wildlife Refuge in February, aboard the National Oceanographic and Atmospheric Administration (NOAA) ship *Townsend Cromwell*. She checked the condition of the Phoenix Petrel (*Pterodroma alba*) calling machine she deployed there in 2001. The machine was functioning well, but there were no signs of petrels in the area during the visit. On another leg of the same cruise, **Beth Flint** visited Rose Atoll National Wildlife Refuge in American Samoa and found seabird populations there to be healthy. The *Townsend Cromwell* was decommissioned in October after several decades of support for field programs in the Central Tropical Pacific. **Chris Depkin** left Palmyra Atoll National Wildlife Refuge in early fall after over a year at the refuge. While there, he made major progress on rat eradication and on

establishing biological monitoring protocols.

Mark Rauzon conducted two surveys on Ta'u, American Samoa National Park, in collaboration with David Duffy and Holly Freifeld (USFWS, Hawaii). Concern continues over the discovery of Norway rats (*Rattus norvegicus*) at this breeding site for Tahiti Petrel (*Pterodroma rostrata*) last year. Sonograms for the petrel and diets of the rats are being analyzed.

Michelle Wainstein, along with **Peter Hodum** (California State University at Long Beach) have completed the first year of a long-term seabird research and monitoring program on the Juan Fernandez Islands in Chile. They will be focusing on distributions and abundance, foraging ecology, breeding biology, and conservation threats for four species of Procellariids that nest on the islands.

Larry Spear and David Ainley (H.T. Harvey & Associates), in association with **Lisa Ballance** (NMFS) and NOAA, are analyzing the diet of seabirds in the Eastern Tropical Pacific for years 1983-1994. **Larry Spear, Lisa Ballance, David Au** (NMFS), in collaboration with the National Science Foundation and NOAA, are assessing trends in community composition and abundance of eastern tropical seabirds in the context of the exploitation of tuna (*Thunnus* spp.) for the years 1985-2000.

David Ainley, Keith Hobson (Canadian Wildlife Service), **Greg Rau** (University of California at Santa Cruz), and **Paul Augustinus** (University of Auckland), in collaboration with NSF, are studying Snow Petrels (*Pagodroma nivea*) in glacial refugia of East Antarctica. Isotope investigations are being made of layers in 20,000-year-old deposits of stomach oil that accumulate around nests of Snow Petrels. **Ainley** continues his work with **Grant Ballard** of Point Reyes Bird Observatory (PRBO), **Katie Dugger** (Oregon State University), **Peter Wilson** (Landcare Research New Zealand), and **Nadav Nur** (PRBO) to research the factors underlying the geographic structure of Adelie Penguin

(*Pygoscelis adeliae*) colonies on Ross Island and the increasing size of colonies during the past two decades. Other collaborators include **Michelle Hester** (Oikonos), **Hannah Rose Nevins** (Oikonos), **Kerry Barton, BJ Karl** (Landcare Research New Zealand), NSF, and other agencies.

Sandy Bartle of the Museum of the New Zealand is working toward the opening of a major exhibit in their new facilities. He continues to work on making the vast amount of collection information accessible for seabird research.

NON-PACIFIC UNITED STATES

Summarized by **Malcolm C. Coulter**

A series of interrelated studies on diving ducks that winter in San Francisco Bay and breed elsewhere have been completed by graduate students in **Jim Lovvorn's** group at the University of Wyoming, in cooperation with **John Takekawa** and **Keith Miles** of the US Geological Survey (USGS). Master's student **Kammie Kruse** studied nesting ecology of Canvasbacks (*Aythya valisineria*) at Ruby Lake, Nevada for 3 years. The best predictor of nest success was depth of the snow pack in surrounding mountains up to 3 years earlier. **Kruse** also analyzed band returns for this population from 1968-2000. Of all band returns, 92% were from the Pacific Flyway and 56% were from California alone. In California, recovery distributions shifted from southern California and San Francisco Bay in the 1970s to the Central Valley in the 1980s and 1990s. In the 1990s there were no recoveries in San Francisco Bay, historically the major wintering area for Canvasbacks in the Pacific Flyway. Adult survival decreased by 33% and juvenile survival by 45% between the 1980s and 1990s. **Kruse's** field work at Ruby Lake added 3 more seasons to 11 years of data over a 31-year period.

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In San Francisco Bay, Master's student **Tory Poulton** investigated the foraging behavior of scaup (*Aythya marila* and *A. affinis*) relative to spatial and seasonal patterns of benthic foods. The exotic Asian clam *Potamocorbula amurensis*, which invaded the bay in 1986 and has displaced the native community in many areas, was quite abundant, especially in the top 5 cm of sediments. However, *P. amurensis* declined dramatically from late fall 1999 to early spring 2000. Diving duck predation may be an important regulator of *P. amurensis* numbers in late winter.

In support of the work in San Francisco Bay, **Samantha Richman** did captive studies of Lesser Scaup (*A. affinis*). She investigated effects of differences in nutrient content, digestibility, areal density, size, and depth in the sediments on the relative foraging value of exotic *P. amurensis* versus the formerly dominant native clam *Macoma balthica*. *P. amurensis* was more digestible. For prey densities up to 4,000/m², intake rates decreased dramatically when prey were buried in sand-filled trays at a depth of 6 cm in comparison with 3 cm. Unlike *M. balthica*, almost all *P. amurensis* are in the top 5 cm of sediments where scaup intake rates are highest; and in the field, a much higher fraction of *P. amurensis* are in the length range most commonly eaten by Lesser Scaup. In many respects, *P. amurensis* appears to be a more profitable food than *M. balthica* for Lesser Scaup. However, *P. amurensis* accumulates much higher levels of some contaminants.

Ph.D. student **Paul Kaseloo** also worked with captive scaup to measure the costs of diving to different depths at different water temperatures, and the extent to which heat produced by digestion and exercising muscles can substitute for thermoregulation costs. Jim Lovvorn is developing a computer model to integrate all these results along with data on diets, movements of radiotagged birds, and contaminant levels in scaup in different areas of the bay. This model will be used to assess how changes in food and contaminant distributions in the

bay would affect contaminant exposure of scaup.

Jim Lovvorn and graduate students also continued work on Spectacled Eiders (*Somateria fischeri*) wintering in the Bering Sea. Their goal is to develop a simulation model to assess how changes in benthic communities over the last 30 years might have altered the energy budgets of Spectacled Eiders. During a second icebreaker cruise in March-April 2001, we learned that the eiders ate mostly a single species of clam (*Nuculana radiata*) and select an intermediate length class of that clam. **Samantha Richman** has also completed digestibility and functional response studies relevant to clams in the Bering Sea, using White-winged Scoters (*Melitta fusca*) as a surrogate for Spectacled Eiders. Her studies indicate that burial depth of prey (3 versus 6 cm) does not affect the functional responses of these much larger ducks. Preliminary modeling indicates that the amount of time spent flying between leads in the ice as they open and close is a major determinant of Spectacled Eider energy budgets. Consequently, Master's student **Joseph Bump** is working with Synthetic Aperture Radar data to develop models that can predict the duration of leads and the distance between them under different weather conditions. Our overall model will integrate ice conditions, diving energetics, and long-term data on prey density and composition (provided by co-principal investigators **Jackie Grebmeier** and **Lee Cooper** of the University of Tennessee). This model will simulate energy budgets of Spectacled Eiders during winter over the period when their population declined (mid-1970s to mid-1990s).

Jim Kushlan (Smithsonian Environmental Research Center) reports that surveys of breeding seabirds have been begun in the northern Bahamas. Initial surveys were conducted in 2002, and more extensive surveys are anticipated for 2003. Results are published in *North American Birds*. The inventory is a cooperative venture by the Government of the Bahamas, **Eric Carey** (Society for

the Conservation and Study of Caribbean Birds), **Melanie Steinkamp** of Patuxent Wildlife Research Center, USGS, and Waterbird Conservation for the Americas.

Michelle Hester (Oikonos) spent time in the Caribbean assisting the founders of Environmental Protection in the Caribbean (EPIC), **Natalia Collier** and **Adam Brown**, with their long-term monitoring of colonial seabirds of the Lesser Antilles. The Institute for Bird Populations, St. Martin Nature Foundation, St. Martin Nature Preserve, and Island Conservation Foundation were collaborators.

"Waterbird Conservation for the Americas," Version 1 of the North American Waterbird Conservation Plan, is now available. The document highlights conservation risks to seabirds, as well as waterfowl and other aquatic birds. The plan was developed by an extensive partnership, which included participants at workshops held at PSG meetings. It can be downloaded from www.waterbirdconservation.org, or a hard copy can be ordered from waterbirds@fws.gov. Regional planning is continuing; to participate, contact **Jennifer Wheeler** at Jennifer_A_Wheeler@fws.gov.

OLD WORLD: SVALBARD

Several PSG researchers worked on Svalbard (a.k.a. Spitsbergen) in 2002.

In collaboration with the Institute of Oceanology (Polish Academy of Sciences), **Ann Harding** and **Tom Van Pelt** (ABSC) led the "Little Auk Expedition 2002" to Spitsbergen to study Dovekies (Little Auks; *Alle alle*). Their work built on results from last year's expedition led by **Nina Karnovsky** (University of California at Irvine), and was supported by the Polish Academy of Sciences, the Atlantic Seabird Group, the Augustine Courtauld Trust, and the Gino Watkins Memorial Fund. **Harding** and **Van Pelt** spent seven weeks collecting data from

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their base at the Polish Polar Station in Hornsund. They will test hypotheses on the relationship of adult and chick diets to zooplankton availability and distribution, allocation of parental effort in chick provisioning and fledging, and differences in diet across the season, between sexes, and between adults and chicks. The Polish Academy of Science's R/V *Oceania* spent a week characterizing the marine habitat and fauna in the fjord and ocean waters surrounding the study colony, while **Harding** and **Van Pelt**, assisted by **Magdalena Owczarek** (volunteer from the Institute of Oceanology), simultaneously collected chick diet samples. To examine male-female provisioning behavior both before and dur-

ing the fledging period, they conducted a series of 24-hr watches on color-banded and blood-sampled pairs. **Jan Lifjeld** and **Fridtjof Mehlum** (Zoological Museum, University of Oslo) are collaborating with **Harding** and **Van Pelt** to sex banded birds genetically, and they are also examining extra-pair paternity (EPP) rates in Dovekies. To learn more about the feeding ecology of Dovekies, **Van Pelt** and **Harding** are collaborating with **Keith Hobson** (Canadian Wildlife Service, Saskatoon). In this project they will use stable isotopes in samples of adult and chick blood, chick diets, and reference prey samples to examine differences in adult and chick diets across the season.

Scott Shaffer is working as a postdoctoral researcher in **Dan Costa's** lab (University of California at Santa Cruz). In June-July of 2002, he spent a month working on Svalbard with **Geir Gabrielsen** (Norwegian Polar Institute), conducting a validation study on the body water turnover rate in Glaucous Gulls (*Larus hyperboreus*) and making morphometric measurements on a variety of seabirds in Kongsfjorden, Svalbard. Scott has plans to conduct more work on Svalbard and is also in the planning stages of a pilot project that will study the foraging ecology of Sooty Shearwaters (*Puffinus griseus*).

SEABIRD NEWS

TORISHIMA ERUPTION SPARES SHORT-TAILED ALBATROSSES

On 11 August 2002, Torishima Island erupted. This volcanic island is the principal nesting site of the endangered Short-tailed Albatross (*Phoebastria albatrus*). The species' current breeding population is approximately 1680 individuals, 85% of which nest on Torishima. The eruption was first reported by a nearby vessel and was monitored thereafter by the Japanese Coast Guard. By mid-September, only steam was issuing from the mountain.

There has long been concern that a volcanic eruption could imperil the last foothold on earth of the Short-tailed Albatross. The species was nearly exterminated in the early 20th century for oil and feathers, but a remnant population was discovered in the 1950s. Although the population has been increasing, its status is still tenuous because of its small

size, limited nesting grounds, and threats from longline fisheries. The only other breeding colony is approximately 260 birds on the Senkaku Islands. Torishima is capable of devastating eruptions—in 1902 all the island's human inhabitants were killed, and lava and ash were ejected again in 1939.

Hiroshi Hasegawa, the world's expert on the species, expressed guarded optimism with regard to this event, since the birds were not at the colony (the breeding season is November through May) and the eruption was small. He was able to visit the island as usual in late November; he found that the vegetation and landscape on Torishima were virtually unchanged, and that the breeding population was healthy (e-mail to Thorn Smith).

This eruption, fortunately, has merely been a reminder that improvement in the Short-tailed Albatross's status remains urgent. The US Fish and Wildlife Service, National Marine Fish-

eries Service, government of Japan, and researchers are involved in this effort (see also the regional report for Alaska).

SEABIRD GROUP MEETING

The Seabird Group, the European group that corresponds to PSG, will hold its next conference at Aberdeen University, Scotland, on 2-4 April 2004. The theme of the conference will be "North-east Atlantic Seabird Populations." This will coincide with publication of the book that reports results of the Seabird 2000 project, a comprehensive count of British and Irish seabirds. Further details and calls for papers will be issued in mid-2003. For more information, see the group's website: www.seabirdgroup.org.uk.

Mike Harris

TREASURER'S REPORT FOR 2002

W. Breck Tyler

This report summarizes PSG finances for fiscal year 2001-2002, which ended 30 September 2002. It includes a balance sheet for all active accounts of the Pacific Seabird Group. The report was submitted on 8 December 2002.

ASSETS, EQUITY, AND LIABILITIES

On 30 September 2001, the total assets in PSG accounts were \$112,025.62 (Table 1). Total equity was \$101,537.13, a decrease of \$16,802.04 during the past fiscal year. Liabilities were \$7,532.79 for continued work on the Seabird Monitoring Database, \$2,002.63 for publication of the oil symposium, and \$953.07 in unreimbursed officer and committee expenses.

NEW INCOME AND EXPENSES

PSG generated \$17,738.49 in new income during this fiscal year, 53% from membership dues, 35% from the Santa Barbara annual meeting, and the rest from Life memberships, dividends, library subscriptions, and publication sales (Table 2). PSG accumulated \$13,986.76 in new expenses (Table 2), for a net increase of \$3,751.73. Publication and mailing of *Pacific Seabirds* was the largest (41%) single expense. The symposium

publication grant and monitoring refund are not included in the new income total. The endowment account is considered separately.

ENDOWMENT ACCOUNT

The PSG endowment account is comprised of shares in three Neuberger & Berman Management, Inc. funds—Focus, Guardian, and Partners. The number of shares owned by PSG increases each year but share value (and thus account value) can fluctuate significantly in line with the stock market.

At the end of the fiscal year, the PSG endowment account was worth \$65,343.49. Due to market uncertainty, no Life membership payments were invested in this account during this fiscal year. Capital gains and dividends from the account totaled \$3,139.85 and were automatically reinvested. As a result, PSG acquired 119 new shares and now owns a total of 4,875 shares. Due to declines in share value, the net value of the endowment account decreased by \$20,064.46.

OTHER ACCOUNTS

PSG maintains a savings account with Morgan Stanley Dean Witter and

four other checking/saving accounts for specific needs. The Treasurer's joint checking/saving account is managed by Breck Tyler. The *Pacific Seabirds* account, managed by Editor Vivian Mendenhall, contains funds used in the publication and mailing of *Pacific Seabirds*. The United Kingdom membership account, managed by Mark Tasker, is used for deposits of dues paid in British pounds sterling. Ken Morgan manages the account for members paying dues in Canadian dollars.

ANNUAL MEETING

At the 2002 Annual Meeting in Santa Barbara, income exceeded expenditures by \$6,155.95. A complete financial summary for this meeting will be presented in a future report.

MEMBERSHIP

At the writing of this report, there were 458 active memberships in PSG—351 regular memberships (individual and family), 42 student members, 63 life members, and 2 corresponding members. A total of 32 libraries received *Pacific Seabirds*, 17 of which had paid subscriptions.

(Continued on page 129)

CORRECTION

In the Abstracts for PSG's 2002 meeting, *Pacific Seabirds* 29:72 (2002), a word was omitted in the abstract "Status of the Red-legged Cormorant in Peru: what factors affect distribution and population size?" by Carlos Zavalaga,

Esteban Frere, and Patricia Gandini. The first sentence should have read, "The distribution and abundance of Red-legged Cormorants (*Phalacrocorax gaimardi*) were assessed by visiting 42 localities on the mainland and surveying most of the

islands along Peru's 2500-km coastline between October 1999 and December 2000."

If you notice an error in *Pacific Seabirds*, please let the Editor know.

TREASURER'S REPORT

TABLE 1. Pacific Seabird Group Balance Sheet, September 30, 2002

	Balance	
	30 Sep 2002	30 Sep 2001
ASSETS		
Annual meeting—Kauai 2001	0	\$1,368.96
Endowment funds (Neuberger & Berman)	\$65,343.49	\$85,407.95
<i>Pacific Seabirds</i> account (Mendenhall)	\$1,340.48	\$3,536.71
PSG savings account (MSDW)	\$21,225.58	\$25,864.06
Treasurer's accounts (Tyler)	\$20,998.13	\$7,411.52
Symposium publication fund	\$2,002.63	0
UK membership account (Tasker)	\$949.40	\$749.40
Canada membership account (Morgan)	\$165.91	\$20.66
<i>Marine Ornithology</i>	0	\$1,293.67
Total Assets	\$112,025.62	\$125,652.93
LIABILITIES AND EQUITY		
Liabilities	\$10,488.49	\$7,313.76
Equity	\$101,537.13	\$118,339.17
Total Liabilities and Equity	\$112,025.62	\$125,652.93

TREASURER'S REPORT

TABLE 2. Pacific Seabird Group: Cash Flow, 1 October 2001–30 September 2002

GENERAL

INCOME		
Membership dues	\$9,375.78	
Annual meeting Santa Barbara	\$6,155.95	
Symposium grant	\$2,000.00	
Library subscriptions	\$720.00	
Monitoring reimbursement	\$682.79	
Life member dues	\$630.00	
Interest & dividends	\$472.89	
Publication sales	\$386.50	
Total		\$20,423.91
EXPENSES		
<i>Pacific Seabirds</i>	\$5,680.03	
<i>Marine Ornithology</i>	\$2,219.49	
Xantus s Murrelet petition	\$1,500.00	
Director s insurance	\$1,389.00	
Officers & committees	\$931.15	
Dues (TOC, ABC) ¹	\$650.00	
Tax preparation	\$550.00	
Publication costs	\$533.22	
Banking & legal	\$302.75	
PSG web site	\$214.92	
Total		\$13,986.76
Net (income - expenses)		\$6,437.15

ENDOWMENT FUND

Income		
Capital gains & dividends	\$3,139.85	
Life membership dues	0	
Expenses		
Share value losses	\$23,204.31	
Net (income–expenses)		–\$20,064.46
OVERALL ANNUAL NET		–\$13,627.31

¹The Ornithological Council, American Bird Conservancy

INFORMATION FOR CONTRIBUTORS

Pacific Seabirds is the journal of the Pacific Seabird Group. It publishes short peer-reviewed articles and less formal on reports the conservation of Pacific seabirds and related research. Manuscripts of up to 5,000 words are welcome. Materials should be submitted to the Editor (except as noted below): Dr. V.M. Mendenhall, 4600 Rabbit Creek Road, Anchorage, Alaska 99516; phone (907) 345-7124; Fax (907) 345-0686; e-mail mailfasgadair@att.net. Deadlines are 15 March for the spring issue and 15 September for the fall issue.

CONTRIBUTIONS

Contributors are invited to submit the following:

- **Articles** on original research
- **Reports** (articles on current topics that will not be peer-reviewed—e.g., research in progress or seabird conservation issues)
- **Forum** (discussion of a current topic)
- **Review articles** (these may cover seabirds worldwide)
- **Conservation News** (submit to Craig Harrison, Associate Editor for Conservation, 4953 Sonoma Mountain Road, Santa Rosa, CA 95404, USA; e-mail charrison@erols.com)
- **Other short news items** relating to seabird research, conservation, or the Pacific Seabird Group
- **Book reviews**
- **Letters** commenting on content of *Pacific Seabirds* or other issues. If the topic is controversial, others may be given a chance to review the letter and submit a reply. Printing and editing of letters are at the editor's discretion
- **Art work**, such as sketches of seabirds, either accompanying a text or for publication alone

PEER-REVIEW OF MANUSCRIPTS

Articles and review articles will be submitted to two peer reviewers for technical review. Other types of manuscript can be sent for review if the author requests it or at the editor's discretion.

SUBMISSION OF MANUSCRIPTS

Material may be submitted by either regular mail or e-mail (addresses above).

Materials sent by e-mail should be attached to the main message and should be in Word, WordPerfect, or Rich Text Format. However, materials less than 300 words long may be sent in the body of the e-mail. For manuscripts submitted by e-mail, all tables and figures must also be sent as hard copy via mail or fax. If a manuscript is submitted by regular mail and will be peer-reviewed, send three copies.

For materials submitted by mail, include a computer disk. Do not send computer disks of manuscripts that will be peer-reviewed until the revised copy is submitted. Material on a disk should be in Word, WordPerfect, or Rich Text Format. The disk should include a second copy of the manuscript in Text (ASCII). Indicate whether the disk was made on a PC or a Macintosh (Macintosh is preferred).

FORMAT

Contributors should consult format used in a recent issue of *Pacific Seabirds*. If no example is available, the Editor will send a copy of relevant material on request.

GENERAL

This subsection applies to all contributions, including short news items and abstracts of oral papers.

Manuscripts should be double-spaced with 1-inch margins. If your paper size is A4 (European), the bottom margin should be at least 1 3/4 inch (whether the manuscript is sent by regular or e-mail). Pages should be numbered, except for Tables and Figures.

Use US spelling conventions (e.g., "behavior," not "behaviour" and "criticize," not "criticise"), except when citing non-US journal articles.

Give the scientific name (*italicized*) after the first mention of any genus or species. English names of bird species are capitalized (e.g., Fork-tailed Storm-Petrel). Names of mammals, other taxa, and English names of bird groups are lowercase except for proper names (e.g., blackbirds, shield fern, Steller's sea cow).

If you use an acronym, give the entity's *full* name the first time it is mentioned. Avoid excessive use of acronyms.

Use the 24-hour clock without a colon (e.g., 1830). Give dates as day-month-year. Use metric measures, except when quoting informal statements. For quantities less than 1, use an initial 0 ($P = 0.95$, not $P = .95$).

Typographical conventions follow *Scientific Style and Format*, 6th edition, by the Style Manual Committee of the Council of Biology Editors; Cambridge University Press (1999).

ORGANIZATION OF LONGER MANUSCRIPTS

Articles should contain the following sections, in this order: Title, Author(s), Authors' affiliations (including e-mail for corresponding author), Abstract, Key words, Introduction, Methods, Results, Discussion, Acknowledgments, Literature Cited, Tables, Figure legends, and Figures. **Other types of manuscript** may use a different organization (e.g., a review or report could contain sections on various locations); how-

INFORMATION FOR CONTRIBUTORS

ver, formats for Literature Cited, Tables, and Figures will still apply.

Abstract—An abstract is required for articles and suggested for reports and reviews. It should contain essential information from each section of the text, without statistics. One or more additional abstract(s) may be provided in languages other than English.

Key words—Five to 10 words for use in computerized searching. Species names in both Latin and English should be included.

Introduction—Present the aims and significance of the work, and place it in the context of pre-existing information. State hypotheses that are being tested, if any.

Methods—Describe the methods, location, time, and personnel of the study. Include statistical methods, if any.

Results—Present results that are pertinent to aims given in the Introduction. Where feasible, summarize information and give the full data in Tables or Figures. Give sample sizes and the significance levels of statistical tests. Literature citations normally should not be in the Results section.

Discussion—Summarize the results briefly, then evaluate the results, and develop their importance in relation to other work. Do not include primary results and statistical tests, which belong in Results.

Literature Cited—List all references in alphabetical order of first author's surname. Surname of the first author should be listed first, followed by initials; all subsequent authors' names should be listed as Initial(s), Surname. List all authors in the Literature Cited; do not use "et al." Year of publication follows authors, then title and journal reference. Include page numbers for all cited works, including the total number of pages in a book. Use standard abbreviations for journal titles; if you are unsure, spell them out. Spell out names of agencies and institutions.

The first line of each citation should be justified to the left margin; subsequent

lines may be left-justified or indented. Do not use all-capital letters or italics in the Literature Cited, except that scientific names should be in italics. Examples:

Pratt, H.D., P.L. Bruner, and D.G. Berrett. 1987. A field guide to the birds of Hawaii and the tropical Pacific. Princeton University Press, Princeton, NJ. 409 pp.

Schreiber, E.A., and R.W. Schreiber. 1988. Great Frigatebird size dimorphism on two Central Pacific atolls. *Condor* 90:90-99.

Verify that all items in the Literature Cited are referenced in the article, and vice versa.

For articles read by you in a language other than English, list the citation in the original language. An English translation of the title [in brackets] is optional.

Text citations should be "Surname year" (no comma). Two authors are "Surname and surname year"; 3 or more authors are "Surname et al. year" (but all authors should be given in the Literature Cited). E.g., (Pratt et al. 1987, Schreiber and Schreiber 1988).

Tables—Tables should be numbered in the order they are first mentioned in the text. Refer to each table at least once. Use horizontal lines below the main heading(s); do not use vertical lines in tables. The table (including its heading) should be comprehensible without immediate reference to the text. Data in Tables should not be repeated in the text, except to summarize. If the manuscript is submitted by e-mail, send a hard copy of the tables by fax or regular mail, because table columns usually get scrambled in e-mail attachments.

Figures—Figures should be numbered in the order they are first mentioned in the text. Refer to each figure at least once. Figures should be drawn at least 50% larger than they will appear in print. Make all lettering, numbers, and symbols large enough to be read easily after they are reduced. The figure (including cap-

tion) should be comprehensible without immediate reference to the text. Define all symbols in a legend or the caption. Shading of bars should be black, white, or coarse cross-hatching. If the manuscript is submitted by e-mail, send a hard copy of figures by fax or regular mail.

A high-quality copy of each figure must be submitted with the final version of the manuscript. Acceptable copy includes a good computer print-outs, original drawing, or good reproduction (Xerox prints on normal paper usually are not good enough). Graphics may be submitted as e-mail attachments in TIFF, GIS, or EFS format; JPG is not recommended.

Photographs—*Pacific Seabirds* occasionally publishes photos. The best ones are very sharp and have good detail and contrast. Original glossy prints should be submitted. Digital images submitted by e-mail must be at least 250 dpi (when reduced to publication size). Many digital cameras record at 72 dpi, although some have an option of higher resolution.

Art work—Original art work is welcomed. An original or a high-quality reproduction should be sent. Pen and ink drawings reproduce the most satisfactorily.

REVISIONS AND PROOFS

Materials that are sent for peer review will be returned to the author, along with reviewers' and editorial suggestions. If the Editor has accepted the article, he or she will endeavor to revise and return the manuscript within 60 days. If the article needs major work, the author may be invited to revise and re-submit it for future acceptance.

For peer-reviewed articles, proofs will be mailed to the author before publication. Corrections should be returned within one week (e-mail reply is encouraged). Proofs of other materials will not be sent to the author unless he or she requests them.

PUBLISHED PROCEEDINGS OF SYMPOSIA OF THE PACIFIC SEABIRD GROUP

The Pacific Seabird Group holds occasional symposia at its annual meetings. Published symposia are listed below. They are available for purchase (unless out of print). To order, see the membership application/publication order form.

SHOREBIRDS IN MARINE ENVIRONMENTS. Frank A. Pitelka (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Asilomar, California, January 1977. Published June 1979 in *Studies in Avian Biology*, Number 2. Out of print.

TROPICAL SEABIRD BIOLOGY. Ralph W. Schreiber (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Honolulu, Hawaii, December 1982. Published February 1984 in *Studies in Avian Biology*, Number 8. Out of print.

MARINE BIRDS: THEIR FEEDING ECOLOGY AND COMMERCIAL FISHERIES RELATIONSHIPS. David N. Nettleship, Gerald A. Sanger, and Paul F. Springer (Editors). Proceedings of an International Symposium of the Pacific Seabird Group, Seattle, Washington, January 1982. Published 1984 as Canadian Wildlife Service, Special Publication. Out of print.

THE USE OF NATURAL VS. MAN-MODIFIED WETLANDS BY SHOREBIRDS AND WATERBIRDS. R. Michael Erwin, Malcolm C. Coulter, and Howard L. Cogswell (Editors). Proceedings of an International Symposium at the first joint meeting of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. *Colonial Waterbirds* 9(2), 1986. \$12.00 from Ornithological Societies of North America, PO Box 1897, Lawrence, Kansas 66044; phone (800) 627-0629.

ECOLOGY AND BEHAVIOR OF GULLS. Judith L. Hand, William E. Southern, and Kees Vermeer (Editors). Proceedings of an International Symposium of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Published June 1987 in *Studies in Avian Biology*, Number 10. \$18.50.

AUKS AT SEA. Spencer G. Sealy (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published December 1990 in *Studies in Avian Biology*, Number 14. \$16.00.

STATUS AND CONSERVATION OF THE MARBLED MURRELET IN NORTH AMERICA. Harry C. Carter, and Michael L. Morrison (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published October 1992 in *Proceedings of the Western Foundation of Vertebrate Zoology*, Volume 5, Number 1. \$20.00.

THE STATUS, ECOLOGY, AND CONSERVATION OF MARINE BIRDS OF THE NORTH PACIFIC. Kees Vermeer, Kenneth T. Briggs, Ken H. Morgan, and Douglas Siegel-Causey (editors). Proceedings of a Symposium of the Pacific Seabird Group, Canadian Wildlife Service, and the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia, February 1990. Published 1993 as a Canadian Wildlife Service Special Publication, Catalog Number CW66-124-1993E. *Free of charge from:* Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A 0H3, Canada.

BIOLOGY OF MARBLED MURRELETS—INLAND AND AT SEA. S. Kim Nelson and Spencer G. Sealy (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Seattle, Washington, February 1993. Published 1995 in *Northwestern Naturalist*, Volume 76, Number 1. \$12.00.

BEHAVIOUR AND ECOLOGY OF THE SEA DUCKS. Ian Goudie, Margaret R. Peterseen and Gregory J. Robertson (editors). Proceedings of the Pacific Seabird Group Symposium, Victoria, British Columbia, 8-12 November 1995. A special publication compiled by the Canadian Wildlife Service for the Pacific Seabird Group. Published 1999 as Canadian Wildlife Service Occasional Paper number 100, catalog number CW69-1/100E. *Free of charge from:* Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A 0H3, Canada.

SEABIRD BYCATCH: TRENDS, ROADBLOCKS AND SOLUTIONS. Edward F. Melvin and Julia K. Parrish (editors). Proceedings of an International Symposium of the Pacific Seabird Group, Blaine, Washington, 26-27 February 1999. Published 2001 by University of Alaska Sea Grant, Fairbanks, Alaska. Publication no. AK-SG-01-01. \$40.00 from the publisher.

BIOLOGY, STATUS, AND CONSERVATION OF JAPANESE SEABIRDS. Nariko Oka (editor). Proceedings of an International Symposium of the Japanese Seabird Group and Pacific Seabird Group, Lihue, Hawaii, February 2001. *Journal of the Yamashina Institute of Ornithology* 33(2); Symposium (5 papers), pp 57-147, other papers pp. 148-213. In English with Japanese abstracts. \$75.00.

Information on presenting symposia: Pacific Seabird Group Symposia are initiated by any PSG member with interest in a particular topic. The goal is to present a collection of papers that explore and review this topic, usually at an annual meeting of the Pacific Seabird Group. In some cases the papers are then edited and published as a PSG Symposium. Anyone interested in organizing a symposium must first contact both the Coordinator of the Publications Committee and the Scientific Program Chair for an annual meeting. Guidelines will be provided on obtaining approval and on organizing, presenting, and publishing a PSG Symposium, including the responsibilities involved.

PACIFIC SEABIRD GROUP COMMITTEE COORDINATORS

Contact committee coordinators for information on activities of committees and how you can participate.

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AWARDS COMMITTEE

The Awards Committee consists of the Past Chair, Chair, and Chair-elect. The Committee Coordinator for 2002 is **Bill Sydeman**, Point Reyes Bird Observatory, 4990 Shoreline Highway, Stinson Beach, CA 94970, USA. Telephone: (415) 868-1221, ext. 19, fax: (415) 868-1946, e-mail: wjsydeman@prbo.org

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